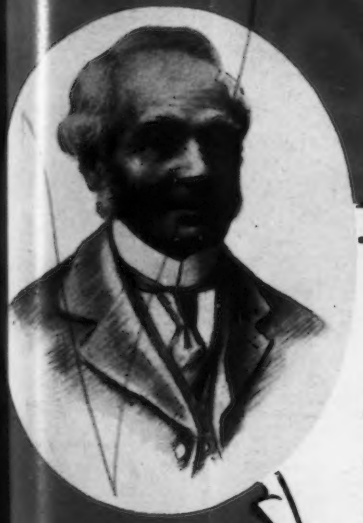
TECHNOLOGY DEPT.

Gas Journal

VOL. 283. 107th YEAR. LONDON, AUGUST 3, 1955 Nº 4809. PRICE 1/3

A CENTURY OF PROGRESS



1855

In 1855 Robert Dempster, a young Gas Engineer, founded at Elland a small Works for the production of all types of Gas Works Plant.

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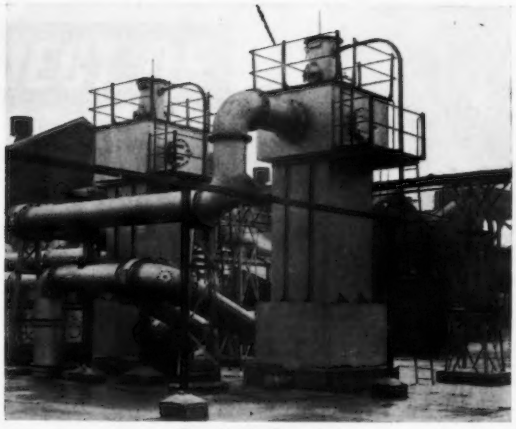
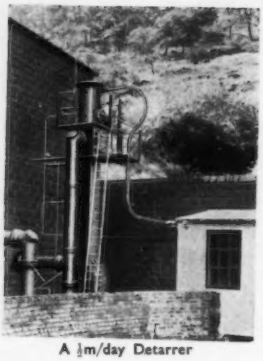


Two 5m/day Detarrers



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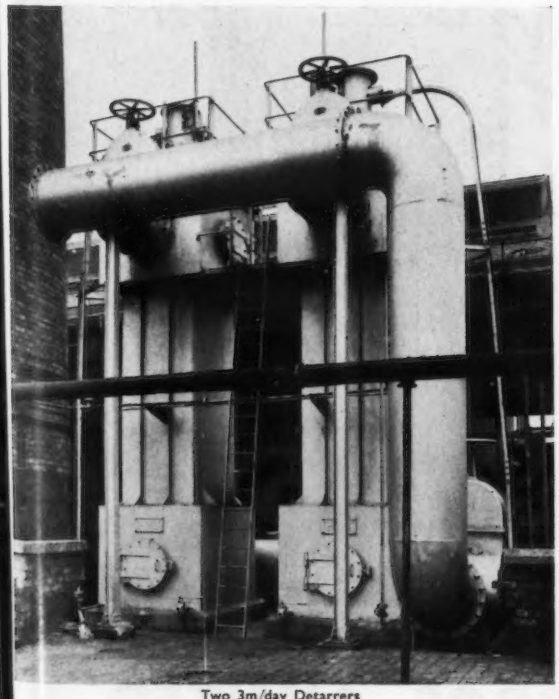

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For over 100 years we have been serving the Gas Industry and the illustrations show equipment recently installed for the North Eastern Gas Board at Birkshall Works, Bradford.

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- Condensing Plant
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- Purifier Control Valves
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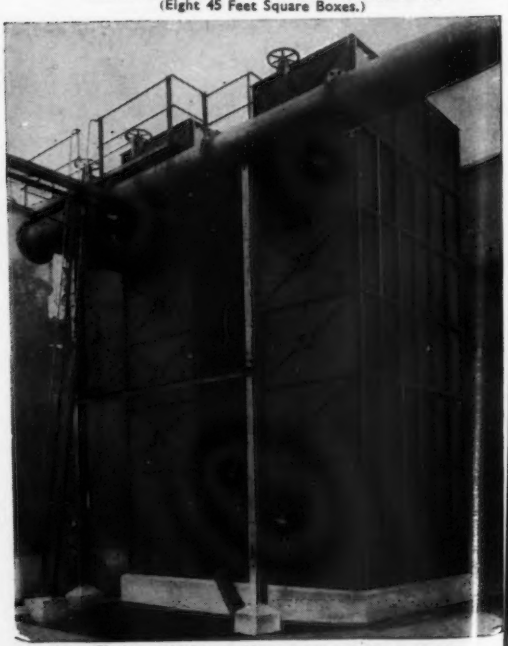
- Briquetting Plants
- Refractory Brick Making Plant
- Special Pipes and Connections in cast iron and steel

Two Clapham-Barwick Pumpless Static Ammonia Washers

Internal deck level view of the Purifier Installation, (Eight 45 Feet Square Boxes.)



Two Claphams' Multi-pass Vertical Water-tube Condensers

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ON THE SUBJECT OF CONTROL

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And what's more, you have to know just when to 'give up'! Which is exactly what Magnetic Valves do in promptly 'failing to safety' when necessity demands. In their own corral, Magnetic Valves have no fewer than 25 years of experience behind them—and it shows in the efficient way they exercise automatic or remote continuous control over air, oil, steam, coal gas—in fact, most industrial gases and liquids. And they do it without resort to glands, stuffing-boxes or driving shafts. The full range of Magnetic Valves, up to 12 in. orifice, is detailed in our illustrated literature, available immediately on request.

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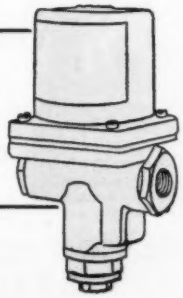
THE MAGNETIC 'R' TYPE SINGLE BEAT STOP VALVE

The standard valve can be supplied in ¼", ⅜", ½", ¾" and 1" sizes, fitted with Full-way orifice, suitable for controlling the flow of Coal Gas or similar medium at pressures up to 10" W.G., although where necessary this type of unit can be supplied suitable for use with pressures in excess of this.
The valve is instantaneous in operation, of "packless" construction, and can be fitted with continuously rated A.C. or D.C. operating coils as required. Furthermore, the standard unit is adaptable to either straight or angle pattern.
A similar type of valve can be supplied suitable for controlling the flow of Water, Air, Oil or Refrigerants, etc.



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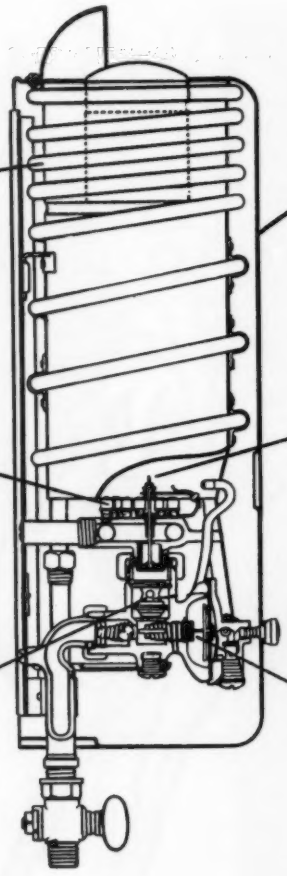

Bray type steatite-tipped burners have an exceptionally long service life. They do not corrode and are not susceptible to blockage.

Exceptionally robust construction of pilot safety device spring and spindle (a rod, not wire) resists wear and accidental damage. PSD can be adjusted from the top.

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Gas and water sections easily dismantled, the water section being removable by itself.

THEY ADD UP TO *Long Service Life*

Simpler Maintenance

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COKE OVEN DOORS

Examples of another of the many uses for

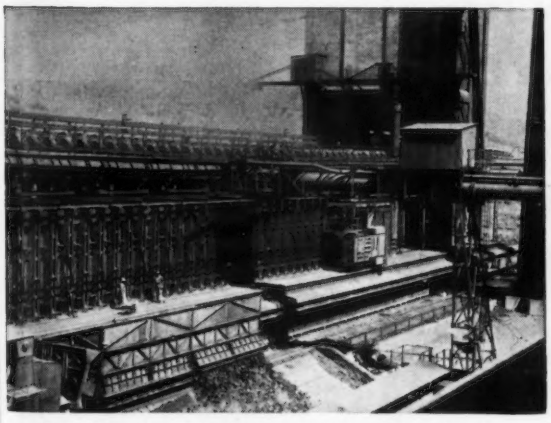
REFRACTORY CONCRETE

Shelton Iron & Steel Co. Ltd., Refractory Concrete door linings ready for installation.

- ✱ Because it will stand up to heavy wear and tear, vibration, mechanical and thermal shock.
- ✱ It eliminates brick joints, cannot be displaced and reduces heat losses to a minimum.
- ✱ It is an ideal material, providing a speedy, simple, economical method of monolithic construction.
- ✱ It has a high cold strength and is ready for full use 24 hours after placing.
- ✱ It is stable under load up to 1300°C.

National Coal Board, Wharncliff. Woodmoor Coking Plant. Coke oven door lined with Refractory Concrete. Also use refractory concrete for lining coke levelling doors, oven wall buttress blocks and for lining ascension pipes.

South Eastern Gas Board, East Greenwich Gas Works, Lining coke oven door in situ



South African Iron & Steel Industrial Corporation Limited have 109 oven doors lined with Refractory Concrete. All charging hole inserts are repaired with refractory concrete.

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The adaptable Refractory material made with crushed firebrick and CIMENT FONDU

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PRESSURE PIPES
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Up to 10″ diameter inclusive.

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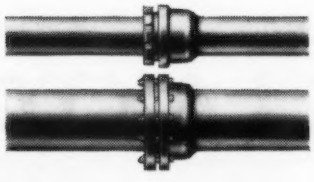

★ *Long life* ★ *Flexibility of joints*
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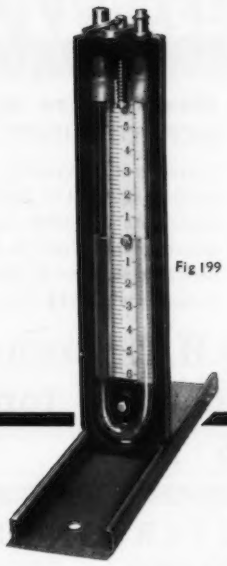

Fig 199

The ideal pressure gauge for soundness testing of all pipe systems.

Now made in 6" and 9" sizes.

The sliding sheet steel base also forms an adequate protective cover.

Prompt delivery from extensive stocks

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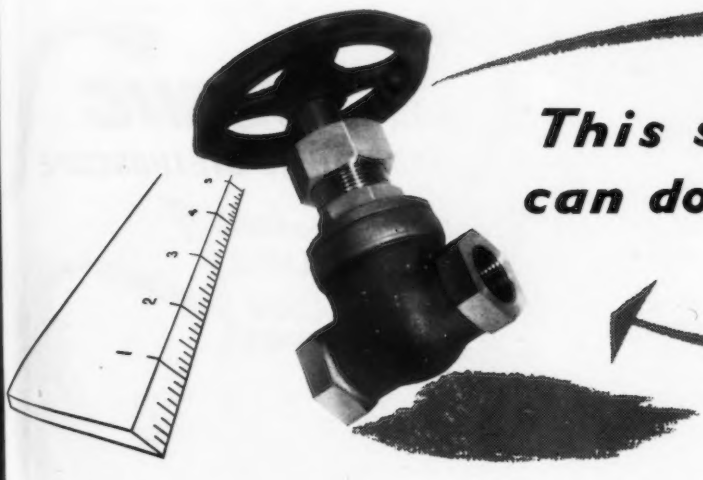

This small valve can do a big job . . .

Hopkinsons' Small Bronze Valves incorporate all Hopkinsons' experience of large valves for the most important applications. They are robust and reliable beyond what is usually expected of small valves. To the engineer who values *exceptional* trouble-free service, these qualities will commend themselves. Write for Catalogue 951 - 'Bronze Valves'

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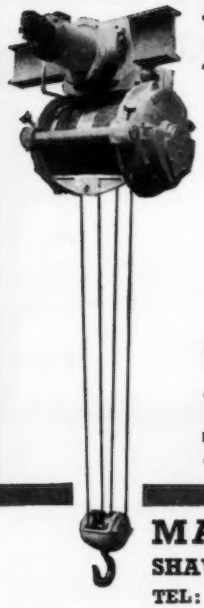

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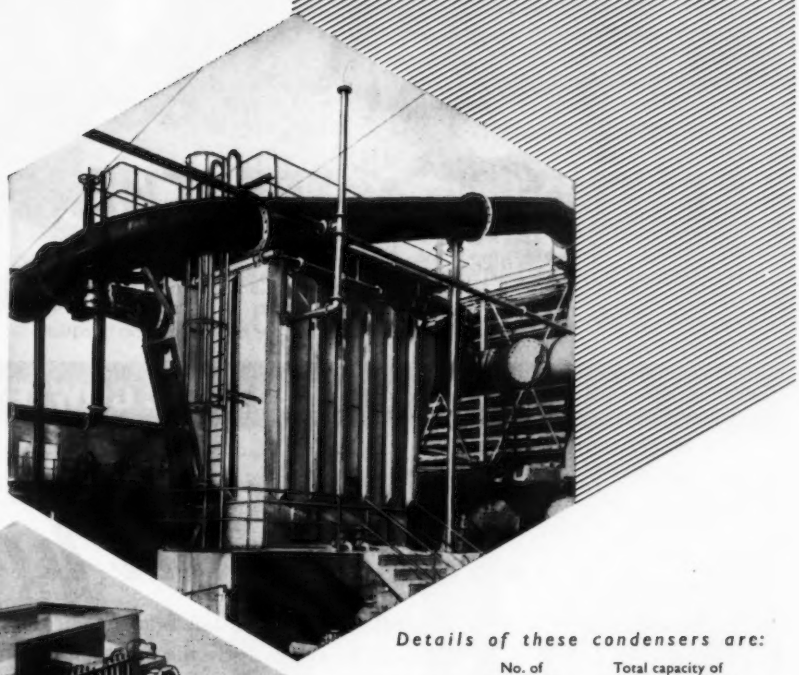

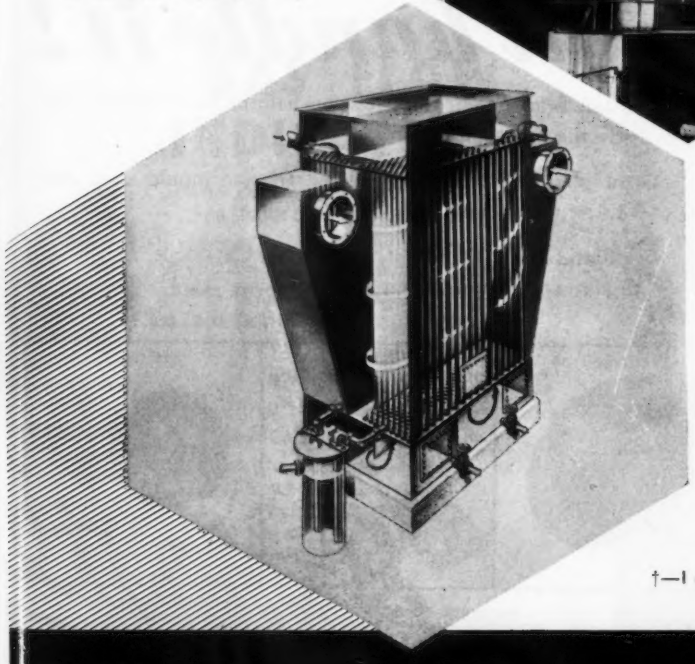

Details of these condensers are:

	No. of condensers	Total capacity of condensing plant
ABERAVON -	2 (s)	6½ mill. cu.ft. per day
BOLTON - -	2 (s)	8 mill. cu.ft. per day
CONSETT - -	2 (p)	16 mill. cu.ft. per day†
DEVONPORT	1	2½ mill. cu.ft. per day*
GILLINGHAM	2 (s)	3 mill. cu.ft. per day
LINACRE - -	2 (p)	8 mill. cu.ft. per day*
NEEPSEND -	2 (p)	10 mill. cu.ft. per day
PAISLEY - -	2 (p)	8 mill. cu.ft. per day*
REDDITCH -	2 (p)	3½ mill. cu.ft. per day*

s—series p—parallel *—operating
†—1 condenser operating. Remainder building or on order.

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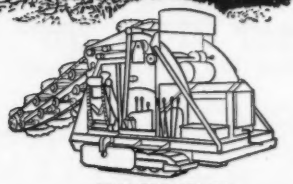

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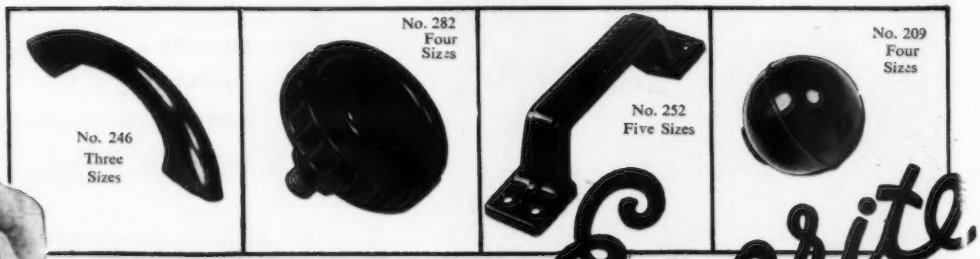

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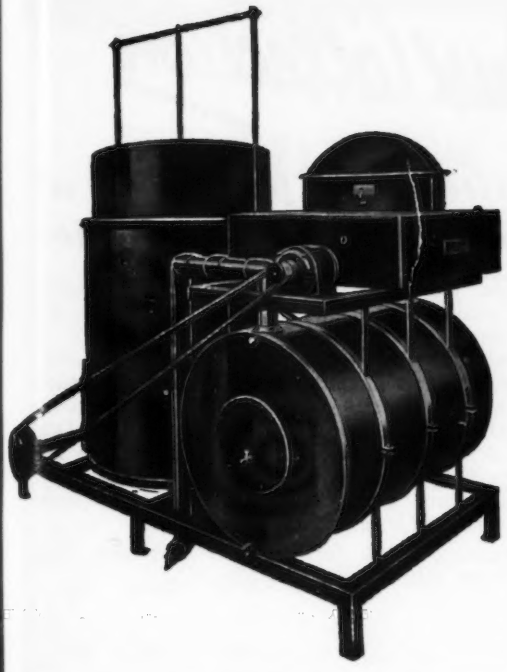

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For all types of gases; can be calibrated to customers' requirements. Brass body, stoved black crinkle finish.

Cast Iron Body for Corrosive Gases.

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All Unions, etc., chrome plated.

Stainless Steel Float, in clear glass tube.

Customers when ordering should state—
(*a*) Specific Gravity and Working Pressure.
(*b*) Maximum and Minimum Rates of Flow.

Size B.S.P. ins.	Max. Capacity Cu. ft./Hr. Coal Gas @ 5/10" P.D.
¼	25
⅜	60
½	110
¾	230
1	420
1¼	650
1½	900
2	1600
2½	2500

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Part of a "Visco-Beth" Automatic Dust Collector

Solves the dust problem at Gas Works and Collieries

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The efficiency of these plants (in many cases over 99 per cent.) for all operations above ground, is confirmed by the repeat orders received. Not only in collieries has "Visco" Dust Collecting Equipment proved successful in dealing effectually with the Dust Problem, but also in steel works, cement works, quarries and other plants where dust is produced in quantities.

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★ PATENT MOULDED RUBBER JOINTS, RUBBER CONFORMING TO B.S.S. 772.

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REMOTE CONTROL

makes gas distribution a one man job!

The district stations in the Southern Group of the Central Division, Southern Gas Board, are remotely controlled from a room at Aldershot. The remote control scheme has been designed jointly by Automatic Telephone & Electric Co. Ltd., who supplied the remote control equipment, and the Bryan Donkin Co. Ltd., who supplied the governors, valves, compressors etc. By means of a single pair of telephone wires to each district station, or to two district stations on a party line basis, e.g., Bordon and Alton, this equipment provides all the following facilities:

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(*b*) Remote indication of flow through volumetric governor into station.

(*c*) Remote control of flow into station.

(*d*) Remote indication of gasholder stocks, with audible and visible alarms for high and low limits.

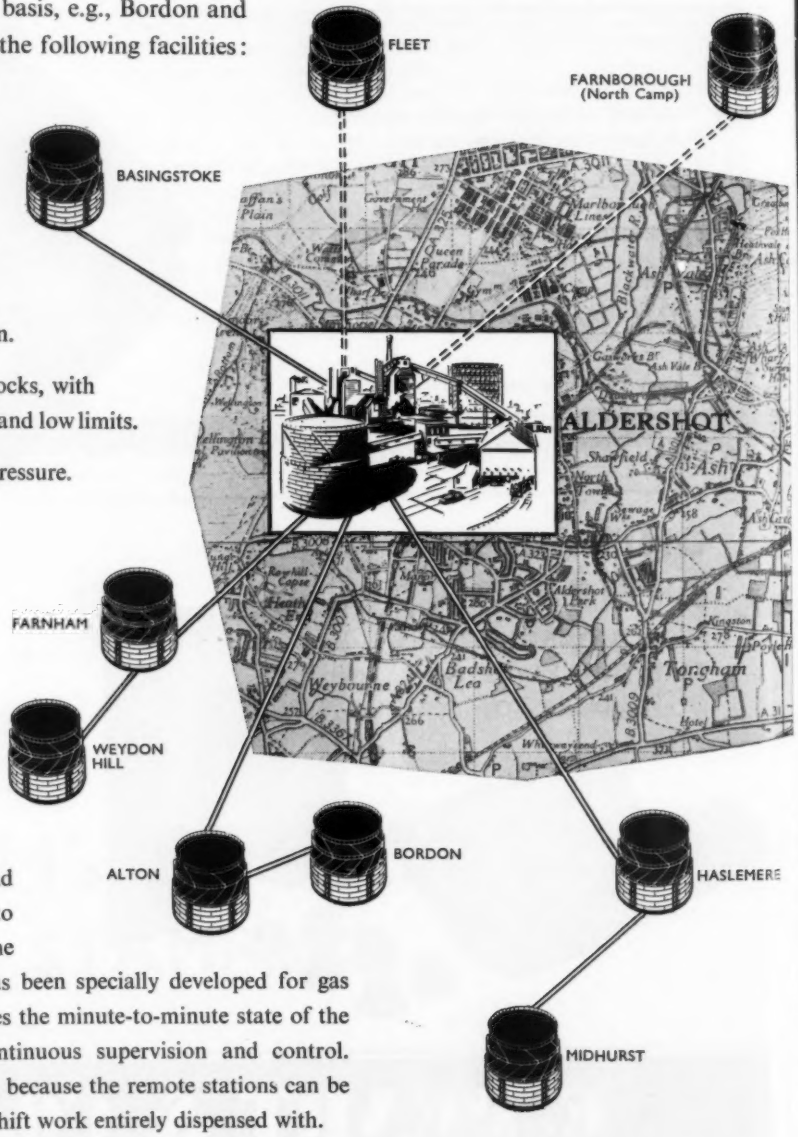
(*e*) Remote indication of the district pressure.

(*f*) Remote control (start/stop) and indication (running/stopped) of the station booster.

(*g*) Remote indication and alarm of electricity supply failure.

(*h*) Equipment testing facilities.

(*i*) Telephone communication.



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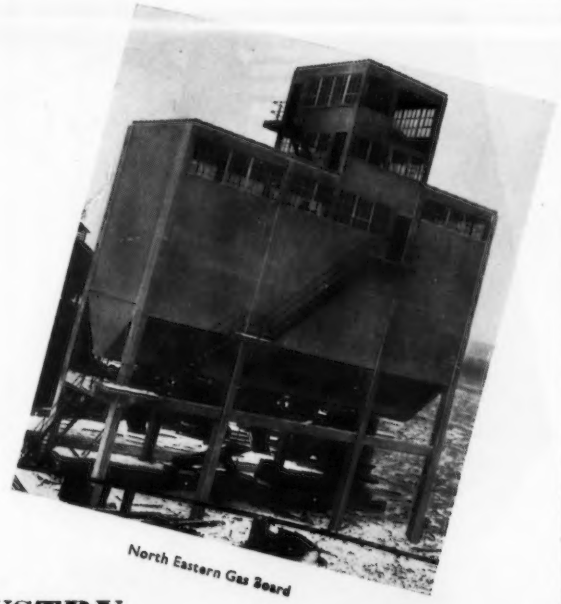

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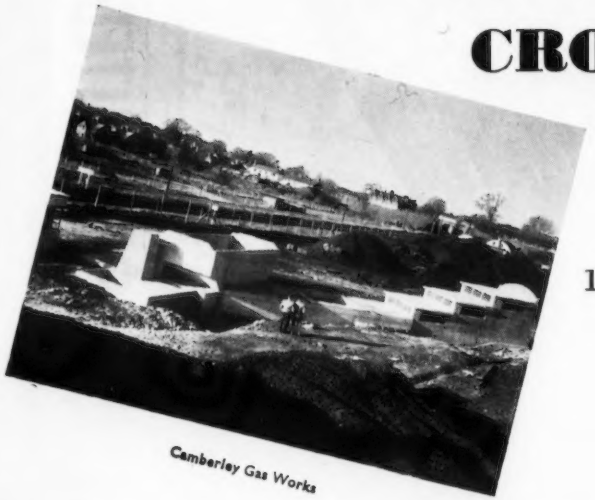

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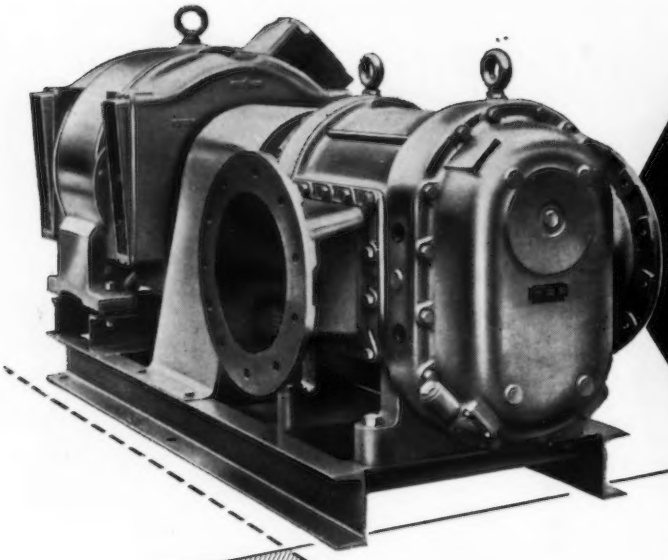

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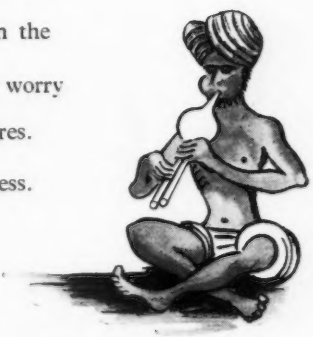

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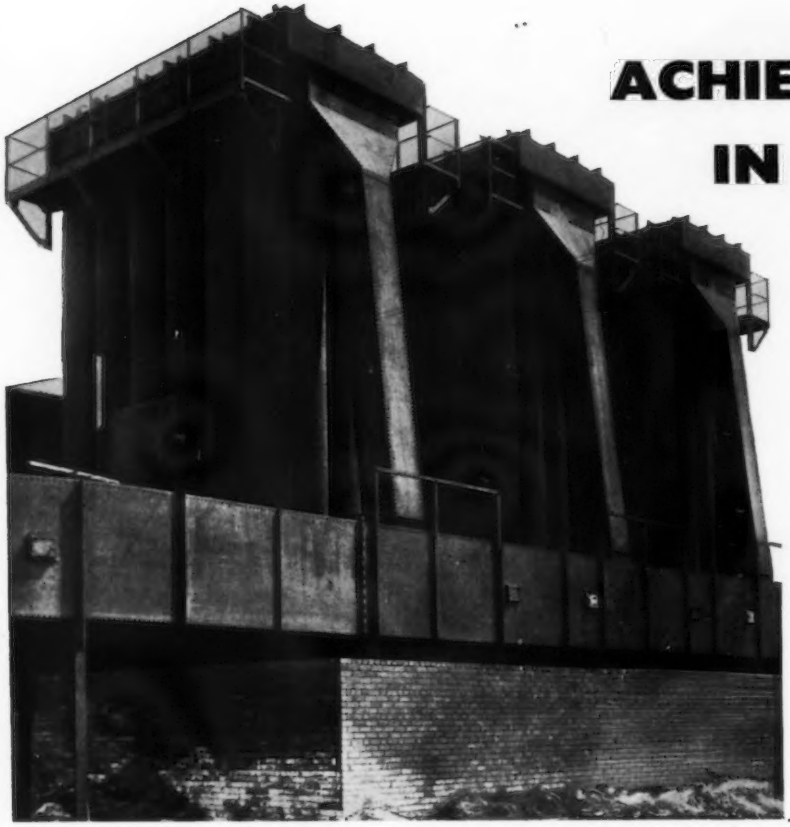

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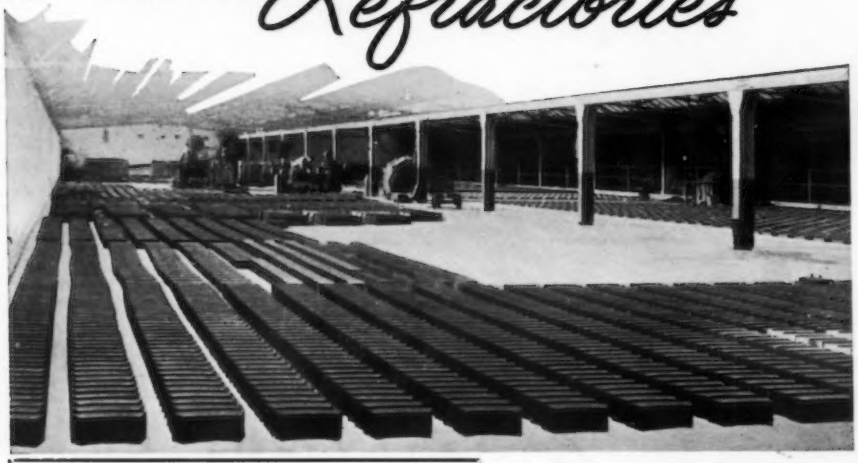

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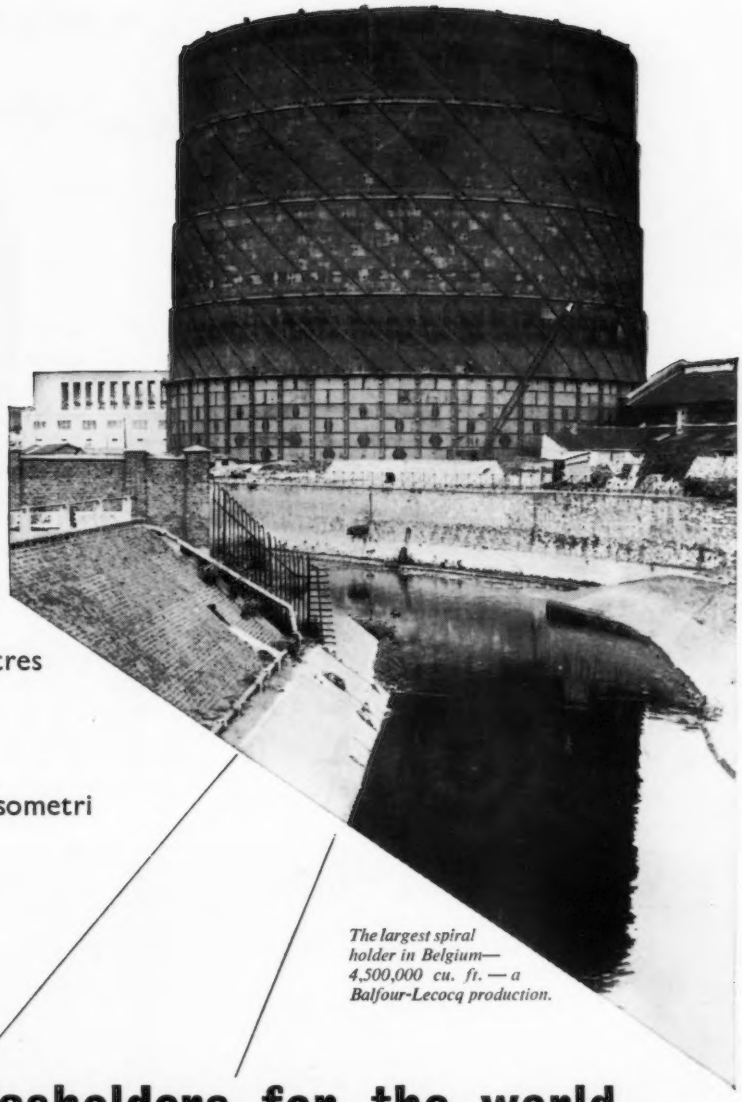

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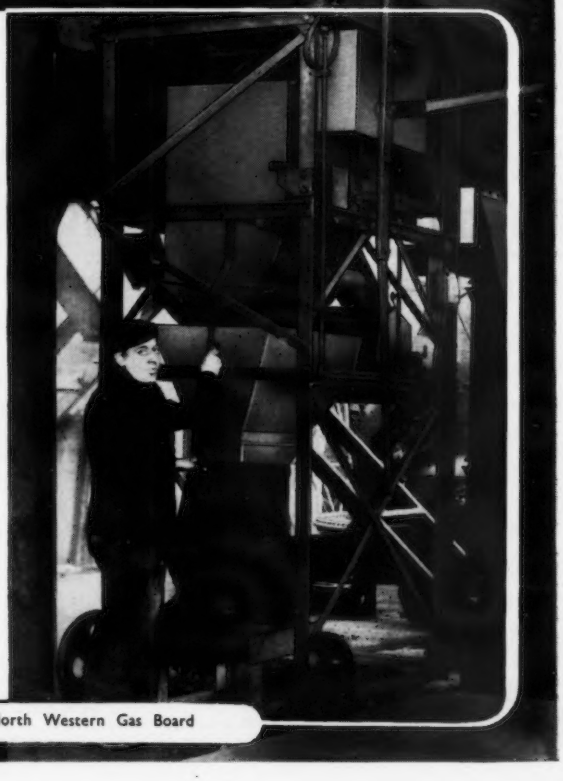

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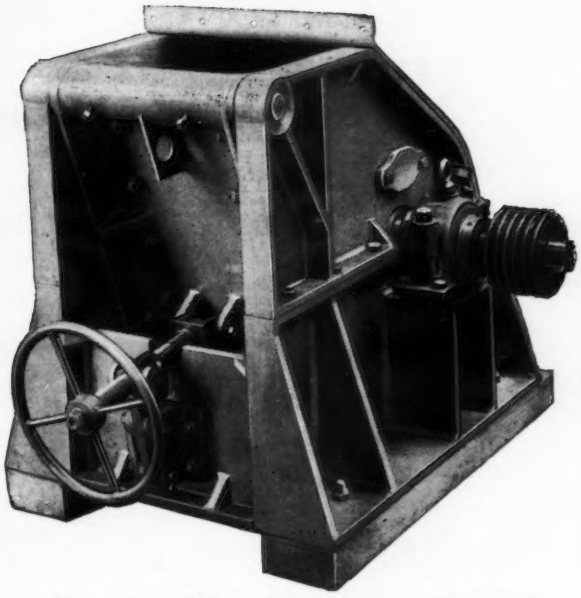

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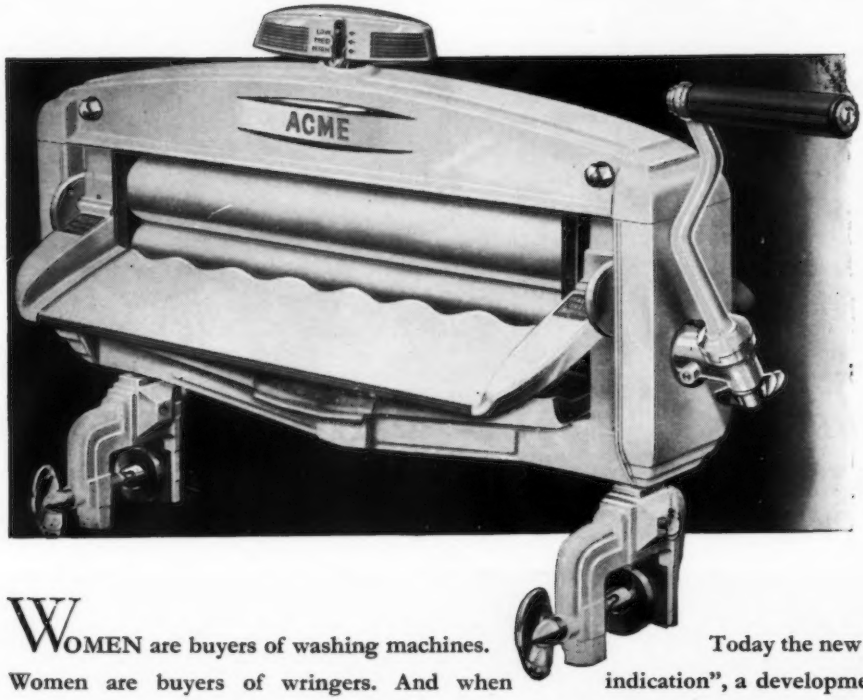

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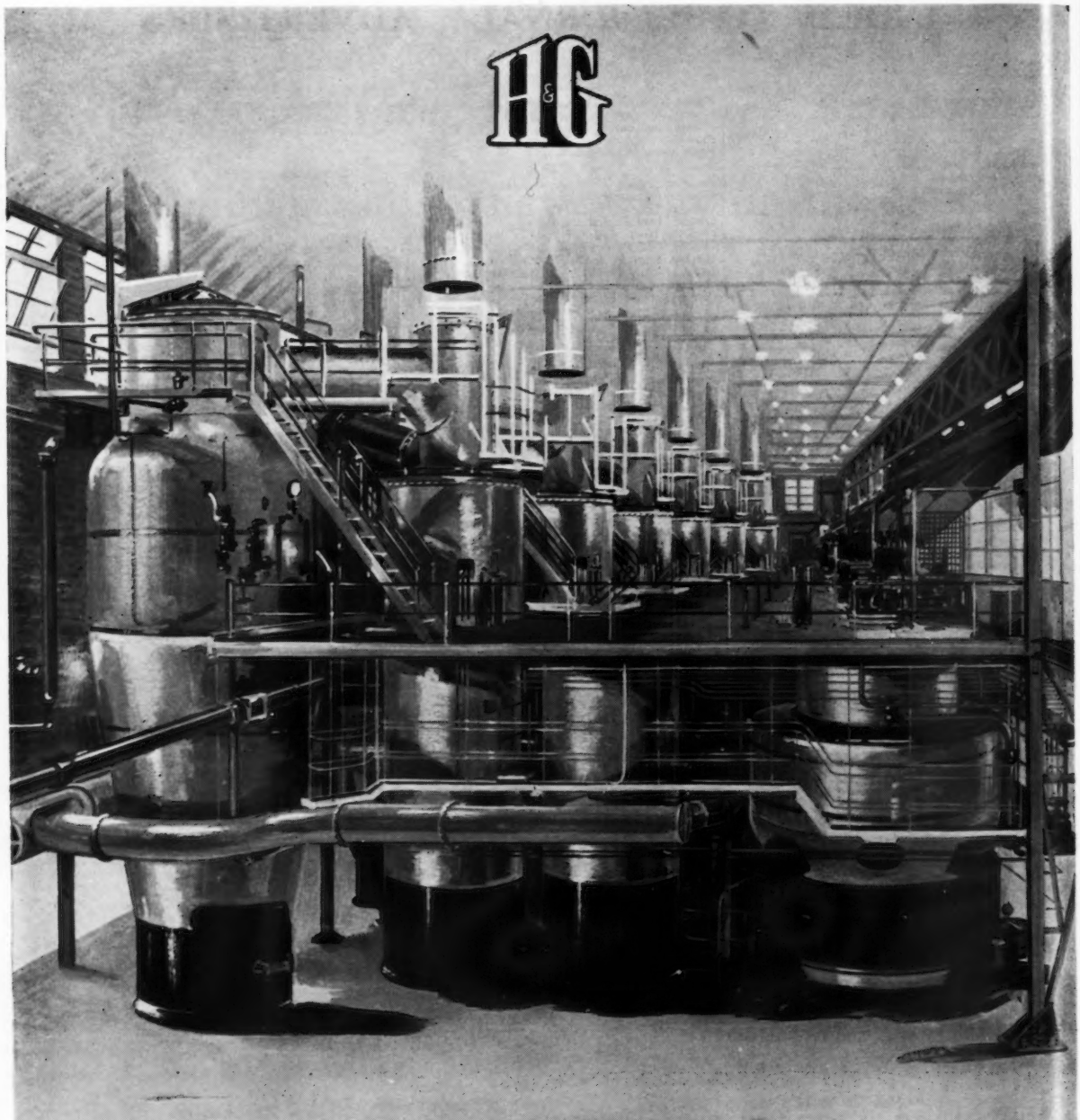

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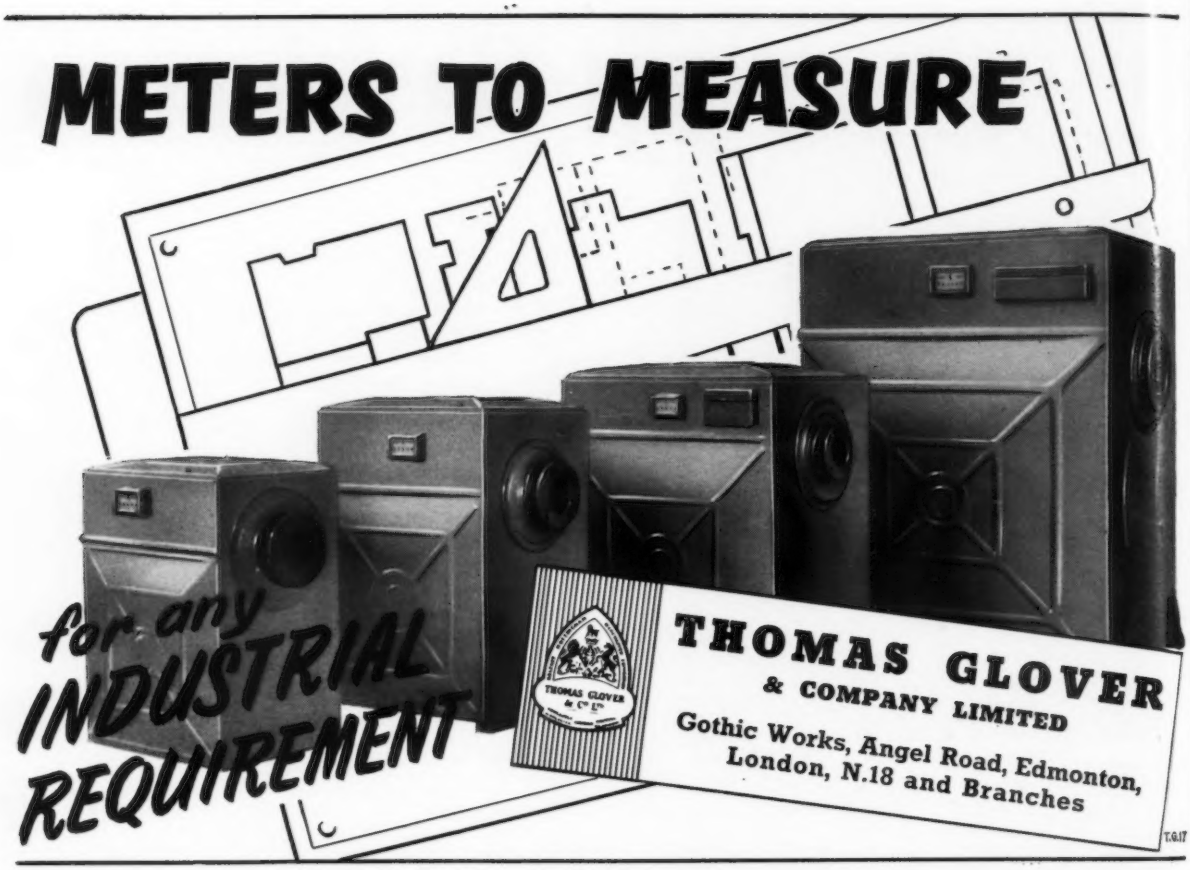

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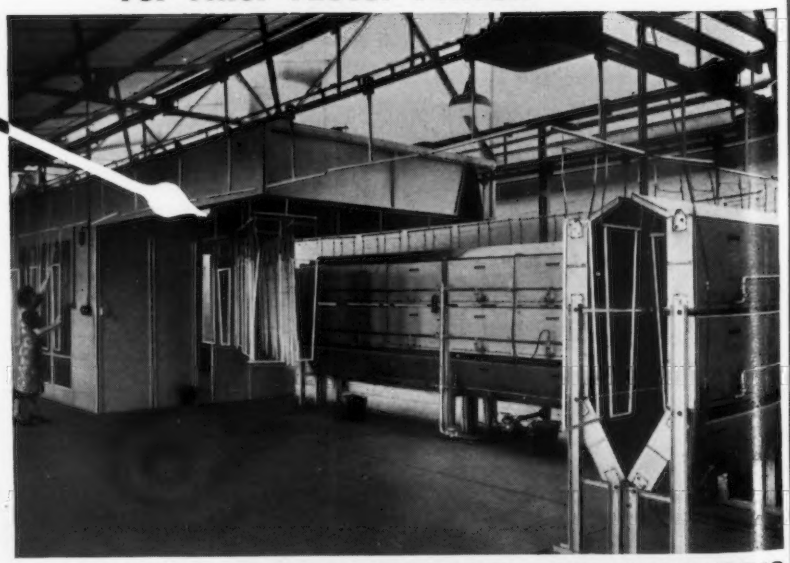

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Gas Journal

VOLUME 283. No. 4809. AUGUST 3, 1955. 107th YEAR

The Clean Air Act, 1955

JULY 27 was indeed a memorable day for the cause of smoke abatement in Britain since it marked the publication of the Government's 'Clean Air Bill.' At long last, the labours of the many committees and other bodies which have considered the abolition of smoke and its close associate, the efficient use of fuel, have obtained a tangible recognition. Something is to be done about smoke. According to their Bill, the Government propose to give effect to the majority of the Beaver Committee's recommendations, and although Parliament is now in recess until October, there is a fair chance that the Bill will have its second reading and pass into law before next winter. However this may be, the Government has declared its intentions *now*, and those industries which are most concerned in implementing them have no excuse for delaying detailed consideration of their plans for measuring up to the new situation.

Among those particularly affected is the gas industry, which finds itself squarely faced with what is probably the greatest challenge in its long and varied history. Since the publication of the Beaver Report last November we have discussed, in numerous leading articles, the significance of the Report for the gas industry, but always there has been at the back of our mind the thought that 'there's many a slip 'twixt the cup and the lip,' and that the Beaver Report might share the same fate as so many others of its kind. Now, however, these doubts have been resolved—the Clean Air Bill is on its way to the Statute Book.

It is obvious that the success of the new legislation will depend on whether or not adequate supplies of suitable smokeless fuels are available within a reasonable time, and it is equally clear that the gas industry has an urgent part to play. During the recent debate in the House of Commons on the National Coal Board Report, the Minister of Fuel and Power explained the necessity for the Coal Board to have a breathing space in which to bring to fruition its development programmes; he also indicated how much reliance he is placing on oil as an immediate salvation of our critical fuel problems. The implications are obvious. The gas industry cannot expect any easing of the coal supply position in the near future and it will need to use oil for gasmaking to the utmost of its ability. In any case, the recent staggering increase in the price of coal is bound to make coal gas so much more expensive *vis-a-vis* oil gas that the latter is an even more attractive proposition than it was only a few weeks ago. Pressure of circumstances has ensured that the large-scale use of oil for town gas manufacture must become an accepted fact, and that the immediate future of the gas industry will be more and more bound up with oil.

How does this affect the coke position, particularly the domestic coke position? The terms of the Clean Air Bill call for the use of authorized fuel in grates and furnaces, and this is defined in the Bill as 'fuel declared by regulations of the Minister to be authorized fuel for the purpose of this Act.' It is a pretty safe bet that the authorized 'fuel' for use in domestic grates, at any rate, will be either gasworks coke or some other prepared smokeless fuel. At the present time, supplies of Coalite, Rexco, Phurnacite, etc., are minute compared with demand, and consequently, coke is by far and away the most important solid smokeless fuel. Under the spur of the clean air legislation future demands for coke are bound to increase enormously, and the gas industry may well ask itself how it can produce more of an acceptable coke at a time when coal is so difficult as regards supplies and price. Here, in fact, is the crux of the problem which confronts the industry—how to produce more gas (an excellent smokeless fuel) and greatly increase the quantity of reactive coke from less coal (of an inferior quality) and more oil!

In Appendix XI of the Beaver Report, Dr. Foxwell outlined one of the means by which the necessary open-grate coke might be produced and marketed by the gas industry. He said 'Investigations have led to the conclusion that, on account of the increased thermal efficiency of coke, or, to put it another way, because the same heat service can be secured with less fuel, the annual cost to the householder will be no greater than it is even though the price of coke is increased sufficiently to make the provision of the necessary improved open-grate coke a commercial proposition to the gas industry.' The answer would seem to be, then, that coke produced at gasworks should be sold at a price consistent with the service it gives, both from the thermal and smokeless-burning points of view provided always that it is a *reactive, free-burning fuel suitable for the open grate.* In other words, let the industry produce a really first class coke which will fulfil the requirements of the clean air legislation and then sell it at an economic price. As regards quantity, the limiting

factor, of course, is the amount of coal supplied to the industry. It is to be hoped that as the new legislation takes effect, coal at present being used inefficiently in industry and the home will be diverted gradually to the carbonizing industries where it can be processed with the maximum benefit to the nation. In the meantime, however, it may be possible to save some, or all, of the coke used in water gas manufacture by replacing the conventional carburetted water gas with a straight oil gas; it may also be possible to save for the domestic market the coke now burnt in producers, replacing this by low grade coal or even oil firing.

This is indeed a testing time for the gas industry—a time of considerable difficulty, but of equally great opportunity. The die is now cast and clean air is to become a reality instead of a pipe-dream. It is to be hoped that, before many years have passed, the gas industry of this country will be provided with all the coal it requires to provide the solid and gaseous fuels needed for a smokeless Britain. Meantime, however, with the raw materials and plant now available, plans must go ahead for tackling the task which is clearly defined and which cannot wait upon events.

Fuel Research and Smoke Abatement

THE tasks that lie ahead of the gas industry in the immediate future in connection with the implementation of the Beaver Committee's recommendations on the abatement of air pollution render the latest Report of the Fuel Research Board, with the Report of the Director of Fuel Research—covering the year 1954—of more than average interest. The Fuel Research Station at Greenwich deals with many problems outside the sphere of the gas industry, but the review of the work accomplished in 1954 shows how many of the problems of fuel economy that are being investigated are closely linked to the question of smoke abatement with which we are now so intimately concerned. It is fitting that the Board should record its satisfaction that the Fuel Research Station, with its knowledge and experience, was able to render service of the utmost value to the Beaver Committee, but it notes that to put its recommendations into practice will require a considerable extension of the work of the Station on many problems of reducing air pollution—an extension that will have to be faced despite the difficulty of recruiting suitable staff. Although authority was given for increases in staff, the problem has not yet been sufficiently eased.

Domestic heating by the burning of bituminous coal is responsible for nearly half of the smoke discharged into the atmosphere in this country, and the Beaver Report must be considered as a challenge that cannot be ignored to effect improvements in this field. The seasonal demand means that the greater part of the domestic heating load must continue to be met by solid fuel as neither gas nor electricity can be stored to satisfy winter requirements. Thus coal must be replaced as far as possible for domestic heating by solid smokeless fuels, among which gas coke is one of the most important. We are reminded by the Report that the coke normally produced at gasworks and coke ovens by carbonizing strongly-caking coals has never been a popular domestic fuel, and that it will not burn satisfactorily on the old-fashioned type of domestic grate that is used to burn coal. Though several million 'improved' grates capable of burning coke have been installed in recent years, most houses are still dependent on the older type of grate, of which 12 mill. are in regular use. Although with the improved grates a large fire can be satisfactorily maintained and its rate of burning regulated, it is still difficult to use gas coke to make a small fire that will keep alight and have a bright attractive appearance. Experimental work has therefore been started to examine the possibilities of using gasworks plant, under conditions not widely different from those normally used in gas manufacture, to produce coke of a more combustible type than normal gas coke. In this work selected weakly-caking coals, of nut size, have been carbonized in Woodall-Duckham intermittent vertical chambers. The resultant cokes have given good test performances and their high combustibility, relative to gas coke, is apparent from the radiation curves.

In the field of domestic heating the calorimeter building at Greenwich is yielding valuable quantitative information on the various ways in which the heat from solid fuel burnt in domestic grates and stoves is used or wasted, and the volume of work has made it imperative to increase to a maximum the use of automatic recording instruments in order to minimize the manpower required. More accurate information than has hitherto been available has been obtained on the factors affecting room-heating efficiencies with different types of heating. For example, with the simple open fire, it has been found that the efficiency with which useful heat is given to the room, directly as radiation and indirectly by convection, increases as the rate of burning is reduced; the efficiency is also increased by the use of a chimney throat restrictor which cuts down the rate at which air is drawn up the chimney. Work on the effects of leaks through badly-fitting doors of openable stoves has shown that such leaks cause appreciable reductions in efficiency, which may be as much as one-quarter.

It has also been found, says the Report, that one model of stove when closed burns coal with as high an efficiency as it burns coke, whereas usually with such stoves the efficiency with coal is lower than with coke. Investigations are being made to find the reasons for the differences in relative efficiencies with coal and coke for different stoves with a view to defining the conditions leading to highest efficiencies and minimum smoke emissions with coal.

Many other sections of the Report will well repay careful study—*e.g.*, the work on the recovery of germanium from the products of coal carbonization, pilot plant experiments on the production of water gas by the fluidized-solids method, producer gas from small coal and coke breeze, and the general review of the measurement of air pollution. During the year under review Mr. Henry F. H. Jones, Deputy Chairman of the Gas Council, and Sir Charles Ellis, Scientific Member of the National Coal Board, became members of the Fuel Research Board, and Engineer Rear-Admiral Sir Sydney Frew replaced Sir Harold Roxbee Cox who, on leaving the public service, ceased to be the assessor for the Ministry of Fuel and Power.

THE ARCHITECT AND INDUSTRY

A letter to the Editor from Monsieur Maurice Veillon, Ingénieur des Arts et Manufactures, Paris—in continuation of previous remarks and with particular reference to the paper recently presented to the Institution of Gas Engineers by Mr. Jefferiss Mathews.

WHEN I was at school an essay was once set on the subject: 'There are places which we admire, there are others in which we should like to live.' Another subject was suggested for meditation by our young minds—i.e., that 'When one's ideas are 24 hours in advance of other men's, one is held to be a fool for just that 24 hours.' I do not remember what naivetés I wrote in my youthful essay. With age, alas! I understand better the wisdom of those two dicta. The technician might well note them.

It is well to make the factory more supportable to those who are called upon to work, and to live in it. This I say quite simply as a man of feeling, as an artist, without wishing to introduce slogans or to make a point in debate. For I am convinced of this—that the factory should be a place in which one passes one's time with pleasure. I have sometimes achieved that. But, also, I have often been considered the 'fool' to whom the moralist alludes. I shall be again, which means that I always try to pursue this idea, to make industrial architecture a social fact, to give a little beauty to the most utilitarian of things.

We, in industry, are not called upon to create monuments, successes; we do not ask for admiration. That is not our rôle. But we have to think of those who pass the active part of their lives in our factories, of the neighbours, of the passers-by, of the city in which our factory is erected. 'The engineer has no right to build the ugly.'

What is behind all these terms—the architect and industry, industrial architecture, the architect and the engineer. Is it not a desire, simply, to do a good job? What does it matter if this result is the work of an architect, or of an engineer, or of a draughtsman?

I should like to make one thing clear. I am not an architect, but an engineer specializing in industrial construction. I hope, however, at the end of a career devoted to construction and to architecture, I may claim to state my opinion, in the social sense which I have just indicated.

Let us look back in this matter. I have seen, in the course of 40 years, a considerable degree of evolution in the field under consideration. At first the modesty of the constructions in question did not call for a special architecture. Often it was a question of imitating other structures, and when something better was required some monumental building in an ancient style was copied. We all know this sort of structure; it causes us to smile.

As industrial structures increased in size, engineers have sought new solutions without calling upon the architects. And these constructions, sometimes very good ones, have been carried out and new styles introduced. In the meantime there has been a tendency towards collaboration between the two professions. Is this desirable or profitable, and, if so, in what sense? Has it always been attended with happy results? Opinions differ. It must be admitted that opposition has been shown, with a little 'esprit de caste.'

I do not think a history of industrial architecture has been written in France. The sum of the documents which I possess on this subject is very interesting and far surpasses the simple demands of curiosity. It may illuminate many points. I hope, one day, to be able to write and develop the few pages which I devote to this subject at the beginning of my 'Notes on Industrial Architecture.'

First of all, in modern industry, can one separate the two functions, architecture and construction? I think we have here an attitude of mind which has often falsified the problem to the point of setting against one another, two activities which in my view are separable only with difficulty. And further, equality being hardly possible, it is difficult to see which is dominant. Let us not try to separate them.

What is modern industrial architecture? It is completely tied up with construction. It is, before all, a technique. It is easy to justify it. The site of an industrial plant is dictated by the demands of the building programme. Foundations are often difficult, for loads are high and the terrain often bad. The volumetric content of the buildings is often great. Foundations must be massive to cope with vibration. There are channels, pipes, cables, to be accommodated; also passage-ways between machines, furnaces, fire prevention, roads, special sanitary arrangements. All this is work for the engineer and the specialist. And the whole must possess an æsthetic value composed of good order, logic, and regularity. It is the æsthetic of the engineer.

The aspect of the building must follow, first, purely technical considerations. Then it may be governed by rules which I have previously set out. The architecture must be 'humane.' There is an æsthetic of the skyline to be realized. In the interpretation of these ideas there are qualities which are in the domain of the architect, while colour is in the province of the artist.

How, and in what form, should collaboration be practised between architect and engineer? My own observations suggest the following. Sometimes the architect is limited to the administrative rôle, being hardly consulted on the art or the technique. At other times, the architect is consulted for the decoration, the covering of buildings, a solution which does not give the best results. On the other hand, there are the pretty rare occasions where the architect is called in to instruct the builder—the architect directing the construction in liaison with the different technicians.

For the correct collaboration between the two functions, it is necessary (and I insist upon that word) that the architect should be consulted at the beginning of the enterprise, taking part in all conferences, being in contact with all the schemes. This requires a flexibility of mind on both sides. If I have understood Mr. Jefferiss Mathews aright, what he says is: 'There must be a great mutual comprehension to attain an end which is really a common end, a fact which has not always been understood.' We are indeed in agreement.

Have I not, even unintentionally, brought into this discussion between architect and engineer, a third element which may bring hesitants together—the constructional drawing office? I do not wish to oppose it to the architect's office. And I have no eye on publicity. But we all know something of these organizations. We are in the age of great technical offices. Modern industry has finished with individual efforts. There are teams of technicians coming from very different origins who work together in powerful organizations. These are a permanent feature of our time.

The solution of this problem which consists in the more or less artificially contrived meeting, at its initiation, between the engineer in charge of the new project and an architect, seems to me to be out-dated. And I say that any separation of these two aspects of the work is deplorable.

I have read with the greatest interest the well-documented paper by Mr. Jefferiss Mathews. I am happy to congratulate him upon it. And I also recognize the interest shown by the 'GAS JOURNAL' and our own *Journal des Usines à Gaz* in this subject. And if I may make any contribution in the form of this letter it is because I think that such exchanges of views between artists and technicians of friendly nations must help to solve the problems which they have at heart.

Personal Notes

MR. BENJAMIN COREY, South Yardley, Birmingham, has retired from Cox Ovenbuilders, Ltd., after completing 35 years of unbroken service. Mr. Corey, who is 70 years of age, first joined the Company when it was manufacturing solid fuel ovens only but was experimenting with the use of gas.

MR. H. R. WARBURTON, Director (Administration), Opencast Executive; MR. R. G. C. COWE, Secretary, East Midlands Division; MR. P. M. D. ROBERTS, Head of Central Secretariat; and MR. WATCYN V. WILLIAMS, Secretary, South Western Division, have been appointed by the National Coal Board as Staff Directors for the Durham, North Eastern, East Midlands and South Western Divisions respectively. The Board is, as recommended by the Advisory Committee on Organization (under the Chairmanship of Sir Alexander Fleck, K.B.E.), setting up a Staff Department. The appointments of Staff Directors for the other Divisions, except South Eastern, have already been announced.

MR. J. SMITH, M.I.MECH.E., has retired as Managing Director of Edwin Danks & Co. (Oldbury), Ltd., and has been appointed Deputy Chairman of the Company. Mr. Smith first joined Edwin Danks as an apprentice in 1909, receiving training in the works and drawing office. In 1913 he joined John Russell & Co. (Walsall), as assistant to the Chief Engineer and, in 1915, he joined A. Harper Sons & Bean as a machine-tool designer for guns and heavy shells. From 1916 to 1909 he was Chief Engineer of the Government Cartridge Factory at Blackheath and, in 1919, he became assistant Chief Engineer to Kynochs, Ltd., of Witton. He returned to Edwin Danks in December, 1920, as Technical Sales Representative, later becoming Manager of the erection and repair departments. He was appointed Chief Engineer in 1938 and Managing Director in 1943. MR. L. W. H. REA, General Manager, has been appointed to the Managing Directorship.

SIR CHARLES DRUMMOND ELLIS, F.R.S., has been appointed Scientific Adviser to the Gas Council. This is a part-time appointment. Sir Charles has also been appointed a member of the Gas Council's Research Advisory Committee. Among the important appointments which Sir Charles Ellis has held are those of Scientific Adviser to the Army

Council; Senior Scientific Adviser, Civil Defence, London Region; and a member of the Advisory Council on Scientific Research and Technical Development to the Ministry of Supply. From 1946 until early 1955 he was Scientific Member of the National Coal Board and a member of the Advisory Council to the Minister of Fuel and Power.

MR. N. A. RICHARDSON, B.SC., A.R.I.C., has been appointed Technical Adviser to the Association of Tar Distillers. He will devote much of his time to wood preservation in which he has had wide experience. He has been a member of the staff of the Forest Products Research Laboratory since 1929 and for many years has been in charge of the section dealing with wood preservation. He acted as Secretary of the Wood Preservation Committee set up at the Empire Forestry Conference in 1947, and in 1950 made an extensive tour of the wood preservation industry in the United States and Canada. Mr. Richardson will work with, and have the facilities of, the Coal Tar Research Association. His experience will be available not only to the members of the Association of Tar Distillers, but to all interested in the use of timber preservatives.

During the week starting August 8 the telephone exchange serving the 'GAS JOURNAL' offices will be changed from Central to FLEet Street. The numbers—2236 and 2237—remain unaltered.

Calendar & Directory Alterations

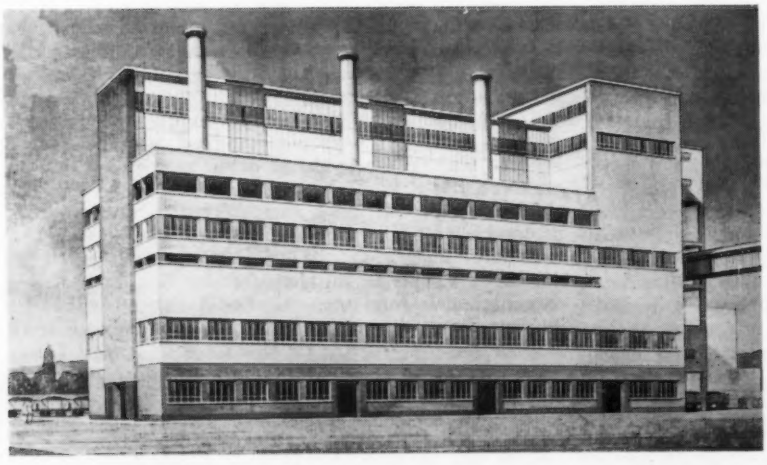
The following changes have been notified during the past month. To keep the information in the current 1955 edition of the GAS JOURNAL CALENDAR AND DIRECTORY up to date readers are invited to note these alterations in the Directory Section.

Page D154.—NORTHERN JUNIORS: P. N. Lee, *President*, vice C. Hindle; J. C. Graham, *Senior Vice-President;* A. S. Tait, *Junior Vice-President;* R. S. Longhurst, *Hon. Transactions Secretary;* C. H. Ling, *Hon. Treasurer.*

Page D108.—REDDITCH DISTRICT: J. Bates, *Group E. & M.*, vice H. E. Chapman (From October 1.)

St. Neots (Hunts.) Urban District Council is to provide gas water heating installations in 39 of its council houses, at a cost of £57 per house.

Oxford's New Gasworks



Woodall-Duckham Construction Co., Ltd., has received from the Southern Gas Board an order for the new carbonizing plant to be built on a virgin site at the Cowley New Works, Oxford. The contract includes three benches in line totalling 48 W-D continuous vertical retorts capable of carbonizing 486 tons of coal daily and of producing 6 mill. cu.ft. of gas; nine step-grate producers arranged in three independent batteries; three waste heat boilers; comprehensive coal and coke handling and coke screening and storage plants; dust extraction and vacuum cleaning plants. The buildings associated with the new installation have been designed with special reference to views expressed by the Royal Fine Arts Commission which has approved the architect's final design as illustrated.

WATER TREATMENT*

By C. W. DRANE, B.Sc., A.R.I.C.†

THE problems of water treatment in the gas industry are mainly those encountered in steam boilers, and this paper is therefore, confined to this topic.

The following is a brief summary of the main constituents of water which may necessitate treatment:

Dissolved Gases: Oxygen, carbon dioxide—less often ammonia, hydrogen sulphide, etc.

Suspended Matter: Mineral solids, e.g., clay and sand; organic solids, dead or living, including plant debris, bacteria, algæ.

Colloidal Matter: Especially soil solids and peaty matter.

Dissolved Compounds: Calcium and magnesium salts—'hardness'; sodium salts, e.g., chloride, sulphate, and nitrate; iron and manganese salts—which oxidize on contact with air to form deposits.

The quantities involved are quite small, even in waters which are classified as very saline or excessively hard. Few supplies have hardness figures of more than 500 p.p.m., which is equal to 0.05%. Waters with only 50 p.p.m. hardness can produce quite large amounts of scale and some of the softest supplies in the country with, say, 10-20 p.p.m. hardness, may require treatment for scale prevention in steam plant. Some other impurities may be troublesome in far smaller quantities.

The following is a general classification of the types of sources and the characteristics to be expected:—

(1) *Upland Gathering Grounds.* The water is usually soft and low in mineral matter, but often contains peaty and other organic matter. Such supplies are also normally corrosive.

(2) *Underground Supplies* (wells, boreholes, springs). The water is usually of high organic purity. The mineral content varies with the geological formation from which it is obtained, but is frequently high.

(3) *Lowland Streams.* The organic quality is usually low and the mineral content is very variable. Canal waters, particularly in industrial areas, may contain considerable amounts of both mineral and organic contaminants.

A useful scale of hardness is that given by Thresh, Beale and Suckling:—

	Hardness (p.p.m. $CaCo_3$)
Very soft	0-50
Moderately soft	50-100
Slightly hard	100-150
Moderately hard	150-200
Hard	220-300
Very hard	Over 300

Water Hardness

Salts of calcium and magnesium are the cause of hardness, which is defined by the amount of soap required to produce a lather. These salts can be divided into two classes: (1) the bicarbonate or temporary hardness, and (2) the sulphates, chlorides and nitrates, which are called permanent hardness. The difference is explained by the behaviour on heating to near the boiling point, when 'temporary hardness' is lost, by decomposition of calcium bicarbonate to form a deposit of calcium carbonate with the evolution of carbon dioxide, whereas the permanent hardness salts are not so affected. Some permanent hardness salts are, however, deposited under boiler conditions where evaporation takes place, to leave a very concentrated solution of salts.

Calcium carbonate is not the most important constituent of steam boiler scale. Analysis of a great number of scales reveals that the most important constituents are calcium sulphate and calcium silicate. Both are relatively insoluble and are thrown down when waters containing fairly small amounts initially are concentrated by evaporation. Their solubility decreases with temperature which, it is thought, accounts for the hard crystalline nature of the deposit.

Methods of dealing with hardness can be classified as follows:—

(1) Removal of calcium and magnesium salts in an external treatment plant called a water softener.

(2) Locking up the hardness as a soluble complex. This is not often done in water treatment. Complexing or sequestering agents include Calgon and various organic compounds. The method is of no value for scale control in a boiler.

(3) Stabilizing the hardness by means of a very small chemical addition. The best known example of this is threshold treatment with a few p.p.m. metaphosphate, such as Calgon or Micromet.

Water Softening

There are two main types of water softening plants, (1) precipitation softeners, and (2) ion-exchange softeners. Precipitation softeners incorporate equipment for adding suitable chemicals—the 'lime-soda' softener—to the incoming water, mixing adequately, settling and filtering. Modern designs speed up the reaction by heating or by recirculation of sludge. It has been found that, if precipitation takes place on existing sludge particles, it is more complete and more rapid than if there are no sludge particles present. There are now several so-called 'sludge blanket' types of softener, in which this sludge is kept in suspension by means of paddles or similar devices. The incoming water and the necessary chemicals are added to the blanket or slurry zone and the excess water separates from the sludge in a clean water zone. Other plants utilize the effect of heat and, if the temperature is high enough, some of the temporary hardness is precipitated by heat alone, thus reducing the chemical requirement and the volume of sludge produced.

The standard type of base-exchange softener consists of a bed of granular material, which has the property of removing calcium and magnesium and replacing them with sodium. In recent years, modified types of ion-exchange plants have been introduced. One such plant is capable of removing all metals and acid groups from the water and producing the equivalent of distilled water. The process requires two different ion exchange treatments. In the first unit all the salts are converted to the corresponding acids and in the second the acids produced in the first stage are absorbed by a different type of material. The first bed is regenerated with a dilute acid solution and the second with an alkali. For economy, the water is usually aerated between the two stages to remove carbonic acid, which can be removed by aeration as carbon dioxide.

Another plant has a sodium exchange unit and a hydrogen unit in parallel; when the effluents are mixed, the acid of one neutralizes the sodium bicarbonate of the other to form carbonic acid, which can be removed by aeration as carbon dioxide, as in the previous case.

A lime-soda softener removes carbon dioxide and carbonates and produces a water with a reduced alkalinity. It is, therefore, a better type of plant when a hard water, which usually contains a high proportion of temporary hardness, is being prepared for boiler feed. Disadvantages are that there is a sludge disposal problem and that the hardness of the treated water is not as low as zeolite-softened water. The base-exchange method is frequently used for higher pressure boilers either to soften a supply with a low initial hardness, or for final softening after a lime or lime-soda plant.

Internal Treatment

Where there is no external softening plant, it is necessary to condition the feed water, so that it is neither scale-forming nor corrosive. Many chemicals and indeed many substances of doubtful and obscure origin, have been added to steam boilers in the hope of avoiding scale formation, almost since boilers were first used. Naturally, the results of such haphazard treatment were inconsistent and, with the increase in working pressure and heat transfer rates of boiler plants, steps had to be taken to put treatment on a sound basis. Research work

* Lecture delivered on May 19 to the Manchester District Junior Association of Gas Engineers.

† Albright & Wilson, Ltd.

was commissioned in the United States of America in the early 1920's. The chief investigator was Dr. Ralph E. Hall. The principles which he laid down are still accepted as the basis of treatment methods.

Dr. Hall examined the problem very carefully, and his main argument was that scale prevention must be based on equilibria maintained in the boiler water, rather than on specific additions to the water. He found, however, only two calcium compounds which could be precipitated in an innocuous form in boiler water, and suggested additions of chemicals with the object of precipitating one or other of these compounds. A thorough search of known chemicals was made and it is unlikely that any other suitable precipitants were missed.

The two calcium compounds which form freely-flowing sludges are calcium carbonate and hydroxy-apatite (basic calcium phosphate). Calcium carbonate can be precipitated by maintaining an excess of carbonate ion in the boiler water; this method of treatment is known as carbonate conditioning. Hall found that this could be controlled by maintaining certain carbonate/sulphate ratios, but present practice is to add sufficient carbonate (either directly as sodium carbonate, or by increasing the lime-soda softener charges) to produce zero hardness (by the soap test) in the boiler water. If this can be done while keeping the total alkalinity within reasonable limits, carbonate conditioning is successful. Otherwise, phosphate conditioning must be used.

Phosphate conditioning can be used under a wide variety of conditions and as hydroxy-apatite is a very insoluble substance, its precipitation ensures the absence of crystalline scale deposition. To make sure that there is enough phosphate present to precipitate the hardness, it is necessary to carry an excess of soluble (sodium) phosphate in the boiler water and this can fortunately be measured by means of a simple test. It is also necessary to maintain a definite caustic alkalinity, usually between 10% and 15% of the dissolved solids.

The limitations of carbonate conditioning are (1) that it cannot be used at pressures of more than 200 lb. per sq. in., as the rate of hydrolysis is very great and it is not possible to maintain sufficient carbonate ion without building up an excessive concentration of hydroxide; (2) carbonate conditioning cannot be used to treat feed waters containing much silica. On the other hand, phosphate is stable at all boiler pressures and hydroxy-apatite precipitates preferentially to calcium silicate, so that phosphate treatment has no such limitations.

In practice, carbonate conditioning cannot be employed when naturally soft water is used as make-up feed, even at low pressures, and it is then necessary to use phosphate conditioning. If an attempt is made to add sufficient sodium carbonate to precipitate the calcium, the only result will be an extremely high caustic alkalinity and an appreciable residual hardness, in the presence of which scale-free conditions cannot be expected. Phosphate conditioning is therefore used in boilers operating at a pressure of more than 200 lb. per sq. in., in all boilers where the feed has a high silica content and where the make-up feed is a naturally soft supply.

Carbonate conditioning is most useful: (1) in boilers of simple design, e.g., Lancashires, with lime-soda softened make-up, assuming moderate operating conditions and low silica; (2) for conditioning low pressure boilers, preferably of simple design, with hard feed water. In this example, sodium carbonate is added to the boiler water. This method is less satisfactory than softening, as it does not avoid frequent washing-out, heavy blowdown and some deposit.

Methods of Feeding Phosphates

When Dr. Hall first introduced phosphate conditioning, the only suitable phosphates commercially available were disodium phosphate and trisodium phosphate. These gave the desired effect in the boiler, but produced deposits in the feed system owing to premature reaction with the feed water hardness, if the reagents were passed through the feed system. Hall, therefore, investigated other phosphates and found that a glass-like material which had been discovered in Britain by Graham a century before had the properties he required. It was given the name 'Calgon'—short for 'calcium gone.' The advantage of this reagent is that it can be shot-fed through the feed system. It cannot be added continuously because there is some hydrolysis to orthophosphates which would cause precipitation. If added as a concentrated shot, however, the excess reagent will hold up the calcium hardness for sufficiently long to prevent deposition. This property of holding calcium salts in solution is known as 'sequestering.'

The composition of Calgon is approximately that of the metaphosphate $NaPO_3$. The molecule of the metaphosphate is in the form of a chain, the length of which depends on the method of manufacture. At one time it was thought that there were six P atoms in the chain—hence the name 'hexametaphosphate,' which is sometimes used. Later work has shown that the normal commercial metaphosphate has a chain about twice this length, but there are commercial applications for grades of greater chain length. The commercial material has an Na_2O/P_2O_5 slightly greater than that required for the formula $(NaPO_3)_x$.

In low pressure boilers, there is usually no difficulty in shot-dosing Calgon through the feed system, but occasionally direct feeding is needed for the same reasons. The alkali is usually added continuously to the feed tank, either by means of a drip-feed apparatus, or using a special pump. This raises the *p*H value and therefore gives some protection against corrosion in the feed systems.

In plants with pressures up to 200 lb. per sq. in., it is usually sufficient to maintain a reasonable alkalinity in order to prevent corrosion and for this purpose the range 10% to 15% of the dissolved solids, previously suggested in connection with scale prevention, is satisfactory. Above this pressure the amount of dissolved oxygen in the feed becomes important and the permissible concentration becomes progressively less as the pressure increases. Removal of oxygen by mechanical or by chemical means therefore becomes necessary. Mechanical removal is preferable because the rate of reaction between sodium sulphite—the usual oxygen scavenger—and oxygen is not very rapid, the exact figure depending on the temperature and the sulphite excess. In some plants, the degree of de-aeration is not quite adequate or a variable load may make the feed water oxygen figure variable. It is then good practice to add sodium sulphite to remove the residual oxygen. In some plants the amount of sulphite employed has been used as an index of efficiency for the de-aerator. When the daily consumption has increased, it has been regarded as evidence that the de-aerator requires attention.

Carry-over and Condensate Line Corrosion

Carry-over includes foaming and priming as special examples, but it must be remembered that all steam carries a certain amount of entrained moisture, which will have in it a proportion of the boiler dissolved solids. The lower the dissolved solids, the lower will be the carry-over. Causes of undue carry-over include mechanical factors, such as high working level and fluctuating load and chemical factors such as high concentration of suspended matter and the presence of grease and certain other types of organic matter. The chemical factors point to the importance of utilizing a feed water of good quality and limiting the amount of hardness which has to be precipitated inside the boiler as a sludge.

Under ideal conditions, a Lancashire boiler may perhaps tolerate a figure of 8,000 to 10,000 p.p.m., but with a naturally soft make-up water and standard internal (phosphate) treatment, the usual limit would be 4,000 p.p.m. More complex boilers would operate with maxima of 3,000 or even 2,500 p.p.m. at 100 lb. per sq. in., 1,500 to 2,000 p.p.m. at 250 to 300 lb. per sq. in. and with still lower figures at very high pressures.

Feed Line Corrosion and Deposits

In low pressure plants, feed line corrosion can usually be controlled by maintaining a *p*H value of 9.5 or above. Often this can be done by feeding alkali continuously, but it may be necessary to add more than the amount required for boiler water conditioning. The main objection to this is that it reduces the sulphate/alkalinity and nitrate/alkalinity ratios, often maintained as precautions against caustic cracking. The addition of extra sodium sulphate and/or sodium nitrate may then be necessary. It should be observed that with a lime-soda softened feed, the treated water will often be directly suitable as a feed water, not requiring any *p*H adjustment. At high pressures, mechanical de-aeration will be carried out to

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protect the boilers and this will also be helpful in protecting the feed systems. Even with an efficient de-aerator, however, it may still be necessary to raise the *p*H value for maximum protection.

Feed line deposits usually arise, (1) when a hard water is being fed, especially if sodium carbonate is being added to the feed tank for boiler water conditioning, and (2) from an unstable lime-soda softened feed.

The Waste-heat Boiler

The solid fuel boilers in gasworks need little comment, as they follow the pattern of other industrial plant, and the same applies to gas-fired installations. A type of boiler which should perhaps receive individual consideration is the waste-heat boiler.

The mechanical characteristics of the waste-heat boiler are determined by the relatively low grade of heat to be utilized, which calls for a large area of heat transfer surface. The usual type of plant contains a large number of very closely packed tubes with the steam generation taking place on the outside of and between the tubes. Attention will be confined to the standard horizontal type.

The method of construction of waste-heat boilers makes it very difficult to remove scale from the tubes, so that it is necessary for efficient operation to keep the tubes clean. Even a small amount of deposit would have a detrimental effect on the rate of heat transfer. A still further factor is the uncertain rate of scale removal when chemical treatment is commenced. The fact that changes in temperature in a waste-heat boiler are less than in direct-fired boilers is thought, by some authorities, to reduce the rate of scale shedding when, for example, phosphate treatment is commenced. There is little doubt that, on some plants, the rate of scale removal is very much less.

The primary reason for using conditioning is to prevent new scale formation. The removal of old deposit as a secondary effect may be useful, but it is unwise to take too much for granted in this respect. A particularly resistant scale may require some years for its removal, if one depends only on the maintenance of phosphate reserves in the boiler water.

There is a tendency in gasworks to increase operating pressures, but it is understood that pressures of more than 300 lb. per sq. in. have not been used up to now. From the water treatment point of view it will probably be most convenient to consider two groups, (1) the normal type of plant operating at about 100 to 120 lb. per sq. in. gauge pressure, and (2) boilers operating at pressures of about 250 to 300 lb. per sq. in. In the standard pressure range, it is advisable to limit the feed water hardness to about 40 p.p.m., although a figure of up to 50 p.p.m. may be considered if conditions are not too severe.

Where a soft mains water is available as an alternative to a private hard supply, it will often be found more economical to utilize it than to soften the hard water, but this is not always so. If the hardness is over, say, 120 p.p.m., it is almost certain that a fairly high proportion will be temporary or carbonate hardness. Treatment for this type of water is preferably by the lime-soda method, unless there are special reasons for employing one of the modern ion-exchange processes. In the intermediate range, hardness 50 to 120 p.p.m. as $CaCO_3$, an ion-exchange method is the only one available, as precipitation softening is ineffective where there is insufficient hardness to produce a good sludge; the type of process chosen will be determined by the characteristics of the water. It has been found by experience that zeolite (sodium exchange) softening tends to accentuate corrosiveness and that maintenance of a substantial boiler water alkalinity is an insufficient precaution. Most of the alkalinity will be produced by hydrolysis of sodium bicarbonate in the boiler water and corrosion probably occurs at points where hydrolysis is taking place.

In the higher pressure plant (250 to 300 lb. per sq. in.) conditions are not unlike those in many industrial water-tube boiler plants, except that the hardness tolerance may be slightly lower. A feed water with a hardness maximum of 20 p.p.m. and a low dissolved oxygen figure must therefore be provided, usually by means of a softener and a mechanical de-aerator. In some installations one of the ion-exchange or combined lime and ion-exchange plants may prove most economical. Final treatment at high pressures will require maintenance of phosphate reserves and usually sulphite reserves, together with restricted dissolved solids, controlled caustic alkalinities and sulphate and/or nitrate/alkalinity ratios above the recommended minima.

At low pressures, the sulphite reserve will usually be omitted, but it will in most plants be advisable to maintain a phosphate reserve. If a feed is suitable only for carbonate conditioning, it is unlikely that it will produce satisfactory results in a waste heat boiler without external softening. A hard water softened efficiently in a lime-soda plant may possibly be used without further treatment in lightly loaded plants under steady conditions, but even then, phosphate treatment would be a useful insurance against accidental changes in softening efficiency. If hardness removal was good, the cost would be modest.

DISCUSSION

Mr. A. H. Barrington (President) said Mr. Drane had given a pretty good resumé of the difficulties they were likely to encounter whenever they altered the temperature of any sort of water.

Mr. D. W. Kay (Manchester) sought Mr. Drane's opinion on tannins or starch in conjunction with phosphate reserve. Was it really necessary to carry phosphate reserve, and what would be the cost of keeping it?

Mr. Drane, in reply, said tannins and starches were of use but his feeling was that they were not required with phosphate conditioning for most boilers. There were one or two special circumstances where they were needed. Tannin was able to do various things in boilers, but it was very difficult to prove if it did any of them. There were many plants working without tannins or starches with phosphate conditioning. With carbonate conditioning there might be some advantage in using tannin. A good quality tannin did not give much trouble. Starch was specially good for absorbing oil. If they did not use phosphate conditioning they were liable to get scale. The annual cost was only a small part of the overheads of the plant.

Mr. D. W. Kay (Manchester) asked if there was any advantage at all in adding phosphate.

Mr. Drane said a celebrated railway organization was doing research. As a scale conditioner it was better than anything else. If they did not carry a reserve they would not measure how well they were doing.

Mr. L. G. Townsend (Liverpool) asked what was the incidence of caustic embrittlement in this country. They could produce a good water for boilers by using lime soda plant, but did it really take care of silica? What sort of scale would be expected on soft water in boilers operating at 300 lb. per sq in.? They quite normally talked about blow-down. One wondered whether there was something to be said for the blow-down system for water treatment. He asked why hydrazine was not in world-wide use, and he confirmed that tannin water could be a nuisance. He asked for information about anti-foaming devices.

Mr. Drane said the question of caustic cracking instead of embrittlement was largely a fashion. Embrittlement was wrong, but it was 'one of those fashions.' It must be confusing. In this country the incidence was low. In figures given two years ago it was, he thought, 35 boilers within 15 or 17 years. There was some silica reduction in a hot lime soda plant. The modern materials were mostly organic compounds. The difficulty of returning the blow down to the softener lay in controlling the softener. Because of that difficulty in controlling, and partly in keeping boiler dissolved solids down, it was not popular. He had had experience with two, and they worked reasonably well. The chemical results were quite good. The alternative method was a heat exchanger on the blow-down, which should be used far more than it was. In naturally soft waters there were other acids and even if treated with alkali they were not always overcome.

Hydrazone did not seem to be making the progress hoped for. One disadvantage was the forming of ammonia in presence of oxygen. They had to control the working figure in the boiler to a very fine margin. The question of suspended solids was important when considering foaming in boilers. There were anti-foaming chemicals on the market but at present their efficiency was open to doubt.

Mr. Norman Hare proposed a vote of thanks to Mr. Drane which was cordially endorsed by all present.

Gas at the Great Yorkshire Show

On the left is the attractive façade to the Industrial Section of the North Eastern Gas Board's exhibit at the Great Yorkshire Show, constructed and erected by the Board's Drighlington Display Centre. On the right is the façade of the Domestic Section.

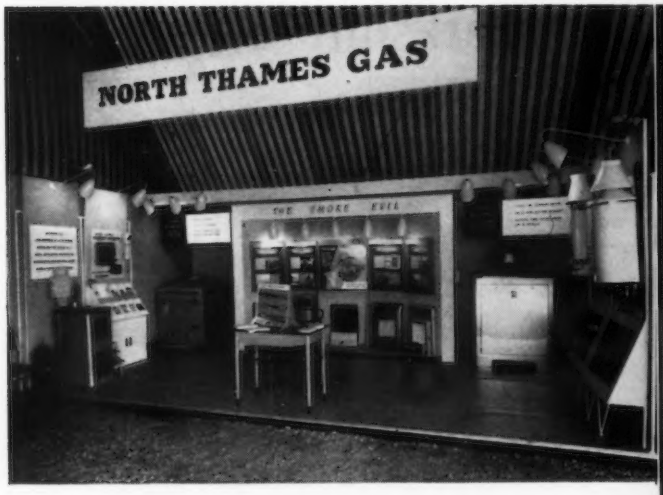
IN perfect weather 76,903 people attended this year's Great Yorkshire show. It was the fifth time that it has been held on the permanent ground at Harrogate. There is no doubt that a show of this calibre gains considerably from its more solid appearance. By the 1956 show even more will have been done in the way of tarmac roads. This year saw the improved main ring and the grandstand for 6,000 people.

Occupying a central position between the members' pavilion and the main grandstand stood the stand of the North Eastern Gas Board, using an area of 3,200 sq. ft. Although it was not possible to assess the total number of visitors it was obviously very well attended. As in previous years the stand was divided into two sections. The front was devoted to an attractive display of domestic equipment which included cookers and water heaters and a special section on washing machines. The latter, with a perspex Parkinson 'Live Water' machine, was used for demonstration purposes.

In the rear section was a display of industrial equipment of agricultural interest. It included a Slade Curran crop drier for grain, seeds, grass, wool, etc., an Ascoli fat clarifier and ham and beef cooker, a Perkins 50 gal. gas-heated pasteurizer, an Apex rotary hydro bottle washing machine, a Controlled Flame No. 25 steam raising boiler which was connected up to a sterilizing chest and steaming stool, a 40 gal. steam jacketed pressure pan, a Dowson & Mason gas-fired smokehouse, two Mastertherm No. 2 space heaters, and two Schwank Radiant overhead heaters which were installed in the roof of the Dutch barn which houses the whole exhibit.

Among the other exhibitors at the Show were some who cater for both the agricultural and gas industries. We made a short tour to see what they were showing. They included: Lee, Howl & Co., Ltd., of Tipton, who were exhibiting a number of pumps. These were the 'Super Midget' motor-driven, bucket type, with a ½ b.h.p. motor, 120 gal. per hour against a total head of 100 ft., a 'Super Major' with the same motor pumping 260 gal. per hour against a total head of 85 ft. Also on show was a single stage, end suction, centrifugal pump with 2 in. suction and delivery, motor driven, capable of low lift work. Brook Motors, Ltd., of Huddersfield, were showing a range of A.C. electric motors from 0.16 h.p. to 350 h.p. and certain types of control gear for agricultural drives. Gascoignes (Reading), Ltd., were showing their ubiquitous 'Kee Klamps.' Smith & Wellstood, Ltd., of Bonnybridge, Stirlingshire, had on view the Esse Century heat storage cooker, which among its many blessings heats 40 gal. of hot water and burns any sort of solid fuel, and many others in their range of solid fuel appliances. The Four Oaks Spraying Machine Co., Ltd., was exhibiting equipment only suitable for the agricultural industry. Barnards, Ltd., of Norwich, also confined their stand to that field. Ransomes, Sims & Jefferies, Ltd., Ipswich, were showing a range of their lawn, motor, and gang mowers. Lyte Ladders, Ltd., of Rogerstone, Monmouthshire, had a selection of their ladders in all shapes and sizes, and the Yorkshire Copper Works, Ltd., of Leeds, were exhibiting their 'Yorcalon' (long length) copper tubes and 'Polyorc A' (polythene) plastic tubes for laying underground water pipelines by the Mole drain plough method—no trenching required, also Yorkshire tubes and Yorkshire fittings for hot and cold water, gas (including Calor gas), heating and sanitation. Richard Baxendale & Sons, Ltd., of Chorley, were showing the 'Baxi' patent coke fire.

The centre cooker feature on the domestic stand (left) had the theme 'In this age of speed gas wins every time.' The decor included actual models of current speed traffic. A prospective customer examines the Parkinson Mark V eye level grill cooker. On the right is a view across the middle of the industrial stand with the Slade Curran crop drier in the foreground.



City Smokeless Zone

THE latest area to be declared a smokeless zone, under the City of London (Various Powers) Act of 1954, is the famous 'square mile' of the City of London. With an estimated 10,000 open grates in City premises, the North Thames Gas Board was not slow to seize the opportunity to sell gas space heating. A planned canvass and a sales letter to all known users of open grates, followed by a visit from a representative, resulted in many orders for gas fires, radiators, overhead heaters, etc., and even for cookers and refrigerators. During July, the City Corporation established an Advisory Centre on a site near St. Paul's Cathedral where interested bodies, including, of course, North Thames, put on displays of appliances. Staffed by representatives, these displays created great interest among the many thousands of visitors seeking advice on how best to conform to the regulations and thus contribute to the purity of the City's air.

Appliances on view at the North Thames Gas Board's stand included gas-fired central heating units, a solid fuel boiler with a gas conversion unit designed and developed at Watson House, a gas-ignited coke grate, four gas heaters, and five water heaters. As part of the campaign, the Gas Board took a series of advertisements in the *City Press* and the *Financial Times*, and special 'stuffers' have been prepared which are being sent with gas accounts to consumers in the City.

Coke, which will play an important rôle in the creation of a smokeless zone, was featured at the Advisory Centre on the exhibit staged by the Solid Smokeless Fuels Federation. The creation of this City of London smokeless zone as from October 2 this year is of great importance to the movement for clear air, not only because it will banish smoke from the famous 'square mile,' but also because it is in the very heart of the Metropolis, and may become the starting point of a development which will in time rid all London of an evil its people have suffered far too long.

The four pictures on this page were taken at the North Thames Gas Board's display in the Smokeless Zone Advisory Centre set up by the City Corporation on a site near St. Paul's Cathedral.

Instrumentation and the Gas Industry

PART 5

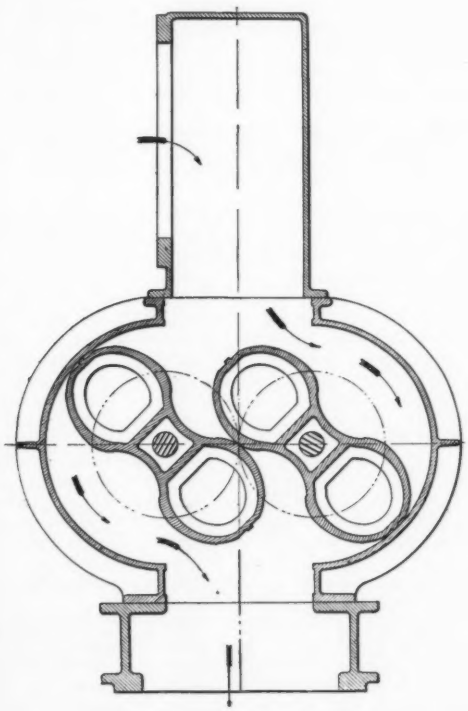
By A. LINFORD, B.Sc., A.M.I.C.E., and G. C. FARMER, Assoc.M.Inst.Gas E.

(Part 1 was published in the 'JOURNAL' of July 6, and Parts 2-4 in consecutive issues.)

IN the preceding part of this article the subject of meters was approached. Now we give below several descriptions.

Roots Type Gas Meters

This meter is a development of the original design of Roots blower, the impellers being figure of eight in section, as illustrated in Fig. 26(a). The impellers are driven by the pressure of the gas passing through the meter, causing them to rotate. Referring to Fig. 26(b) for a complete revolution each impeller passes through the vertical position twice, forming a pocket, A, between the impeller and the adjacent cylinder. Since as there are two impellers, for each complete revolution of the impellers four such pockets are formed, and the gas within them is trapped and released for each cycle of meter mechanism.



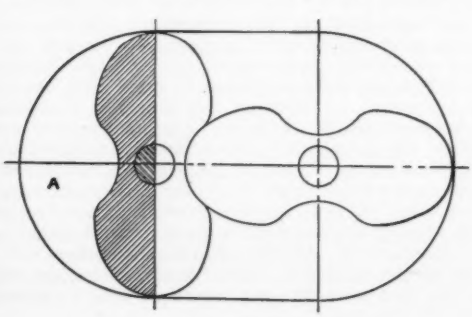


Fig. 26 (a) above and (b) below. Roots type gas meter.

The impellers are timed relative to each other by two pairs of gears, one pair being clamped on the shafts at each end of the meter. As the impellers are formed to true mathematical curves which follow well established equations, the displacement can be accurately calculated. The area of the space, A, is obtained by subtracting one half of the cross sectional area of the impeller (shaded portion) from one half of the cross sectional area of the circle of the cylinder, since the centre line of the circle and the impeller are coincident. This area, multiplied by the length of the impeller, gives the volume of the space, A, and when multiplied by four, a displacement for each complete revolution of the impellers is obtained.

The construction of the meter involves a small clearance of a few thousandths of an inch between the revolving impellers and the casing. This greatly reduces friction and consequently results in a low pressure differential necessary to drive the meter. It has an additional advantage of reducing wear, which would otherwise occur. However, this clearance involves a certain amount of 'slip'—*i.e.*, gas which is passing through the meter in addition to the calculated displacement volume. The 'slip' will occur in the direction of the natural flow of gas through the meter and, consequently, the speed of this gas will tend to be the same as that of the rotating impellers. Further, as the differential pressure across the meter is directly proportional to the speed of the meter mechanism and, consequently, to the volume of gas passing, the 'slip' will represent an almost constant percentage of the gas being passed.

The counting mechanism is operated by suitable gearing via a stuffing box from the main shaft.

For maximum resistance to corrosion, the meter is constructed almost entirely of cast iron, with forged steel shafts supported on ball or roller bearings.

These meters are sometimes fitted with a transmitting device, consisting of a D.C. generator driven by the shaft. The output of the generator is designed to give a voltage output which is proportional to the speed of rotation. Rate of flow indication and integration can then be given at a remote point.

Inferential Meters

(1) *Rotary Vane Type Gas Meters*

This form of gas meter has been in use for a number of years. In effect, it is an application of the anemometer principle, since it consists of a series of vanes, set at an angle of about 45°, which are mounted on a fan wheel. The fan wheel is carried by a vertical shaft, the revolutions of which are transmitted, through a pressure tight gland, to the counting mechanism. Sometimes the gland consists of a mercury seal. To ensure an even distribution over the vanes, the stream of gas passing through the meter is broken up by a series of guide tubes.

(2) *Shunt Type Gas Meters*

The principle of operation of the shunt type gas meter is identical with that of the shunt meter as used for steam flow measurement (see 'Instrumentation for the Carbonizing Process—Steaming of Charges'), but it has entirely different constructional features. The damping vanes instead of being mounted on the spindle below the turbine in a water charged compartment, are now mounted on the spindle above the turbine so that they rotate in a compartment charged with

the metered gas, this compartment forming the by-pass round the orifice plate. Since there is very little driving force, both the turbine and the damping vanes are very much larger than in the shunt steam meter. To reduce mechanical friction to the lowest possible level, the lower bearing of the spindle carrying the turbine and damping vanes is carried on a float which rests on the surface of mercury contained in a small cup, while the counter mechanism is driven through a magnetic coupling instead of the conventional form of pressure tight gland.

Since the damping vanes rotate in the metered gas and not in a liquid of constant density, the flow law of this form of meter is the same as that of inferential and displacement meters, in that it always registers correctly the actual volume of gas passed.

(3) *Differential Pressure Type Gas Meters*

The differential pressure type meter for gas flow is identical in all respects with the indicating, recording and integrating equipment used for low pressure air flow metering, described in detail under heading 'Instrumentation for Carburetted Water Gas Plant—Measurement of Air Flow.'

This particular form of flow meter is gaining popularity in the gas industry as a station meter, as the inherent accuracy of the principle of operation involved is more widely recognized. A limitation is that the meter will only register correct at one particular specific gravity of the gas, and its accuracy is also affected by changes in gas temperature and pressure. However, as indicated when discussing the characteristics of differential pressure meters (Instrumentation for the Carbonizing Process—Measurement of Raw Gas Flow), the percentage meter error is only approximately half the percentage change of the density of the gas from the mean conditions for which the meter is calibrated to register correctly. This feature applies whatever the units of calibration, and it is suggested that the error can be reduced to insignificant proportions if mean conditions are wisely chosen. From the technical point of view at least, automatic compensation for gas density variations occasioned by temperature and pressure changes could readily be incorporated, but at present at least the additional expense and complication involved has not warranted the development of a standard instrument of this type.

The advantage of the differential pressure meter is its low initial cost and ability to measure very large volumes of gas with only fractional increase in cost due to the larger size of the differential pressure generating device. This is an important factor now that very large gas flows must be metered and large gas mains employed.

The operational flow range of a differential pressure meter is of the order of maximum flow for which the meter is calibrated down to one-eighth of this. In instances where a wider range of flow is required, a series of differential pressure generating devices can be so arranged that one registering instrument can be employed with them, this instrument operating over the accurate portion of its range for all conditions of gas load.

INSTRUMENTATION FOR GAS DRYING PLANT

Measurement of Calcium Chloride Solution Flow

Information regarding the circulation rate of calcium chloride solution through the gas washing equipment is necessary for the successful operation of a gas drying plant, but the problem of flow measurement presents some difficulties as a calcium chloride solution is an extremely corrosive liquid.

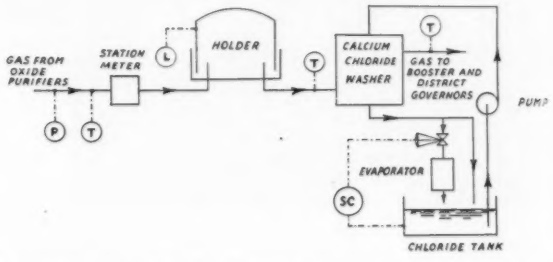
The conventional form of differential pressure flow meter can be used if both impulse pipes connecting the differential pressure generating device to the registering instrument are continuously purged with clean water, which is introduced into the metering system at a controlled rate. The water confines the calcium chloride solution to the pipe through which it is flowing and so prevents it from coming into contact with the working parts of the registering instrument.

It is of paramount importance that the rate of flow of water is sufficiently low to cause negligible pressure loss due to friction as it passes through the metering system and discharges into the pipe carrying the calcium chloride solution. Therefore, it is the standard practice to install a small rate of flow indicator on each of the two branches of the water supply line which are connected, respectively, into the high and low pressure sides of the metering system. The flow of water can then be adjusted by needle valves so that each rate of flow indicator reads the same value; in addition to limiting the rate of flow of water, this ensures that any slight friction effects tend to be cancelled.

An alternative method which may be adopted with a differential pressure form of metering installation for this application is to fill the metering system with a light oil, contact between the calcium chloride solution and the oil being maintained in capacity chambers mounted adjacent to the tapping points on the differential pressure generating device. The oil, of course, forms an effective seal between the calcium chloride solution and the registering instrument.

The need for a purge or conventional sealing system can be eliminated by mounting a pneumatic force balance transmitter (see Instrumentation for the Carbonizing Process, Measurement and Automatic Control of Gas Pressure), adjacent to the differential pressure generating device and applying the differential pressure to this unit. A pressure gauge type of registering instrument can then be used, zero flow corresponding to 3 per sq. in. and maximum flow to 15 per sq. in.

The tapered tube type of variable aperture meter may also be used for this service. In its original form, the tapered tube was made of glass and mounted vertically, with the



P. Pressure measuring inst. T. Temperature measuring inst. L. Level measuring inst. SC. Automatic specific gravity controller.

Fig. 27.—Gas drying plant instrumentation.

smaller diameter at the bottom. The tube contains a 'float,' and when the fluid to be metered is passed upwards through the tube, the 'float' takes up a position where the differential pressure generated as the fluid passes through the annular orifice formed between the rim of the 'float' and the wall of the tube balances the effective weight of the 'float.' The position of the float, therefore, is a measure of the rate of flow and serves as the rate of flow indicator. To maintain the float in a central position within the tube it is constructed with triangular notches which cause it to rotate. This feature, although not always employed now, resulted in this instrument being given the name 'Rotameter.'

The basic principle of the design of this form of variable aperture meter remains unaltered, but the scope of its usefulness has been much extended during recent years. If required, the tapered tube can be made of metal and the position of the 'float' detected by magnetic or electric induction means and its position registered in terms of rate of flow either at the point of measurement or at a distance by utilizing pneumatic or electric transmission.

The advantage of this form of equipment for measuring the rate of flow of corrosive and other 'difficult' liquids and gases is that the metered fluid is confined to the pipeline and constructional materials can be selected for both the 'float' and tube which will not be attacked or otherwise affected through contact with the metered fluid.

Specific Gravity of Calcium Chloride Solution

In the majority of gas drying plants, the specific gravity of the calcium chloride solution is measured by means of a hydrometer. When the specific gravity falls below the desired value, the calcium chloride solution is passed to an evaporator. However, means are available for obtaining a continuous registration of specific gravity and automatic control can be applied to this equipment. A hydrostatic principle of specific gravity measurement is widely used, the pressure exerted by a column of known height of the solution being compared with a column of known height of a reference liquid of known specific gravity—*i.e.*, water. The basic elements of the equipment consist of two cylinders each with an overflow weir constructed at the open top. One cylinder is supplied, with a water drip feed to ensure that a constant level is maintained

excess water lapping over the weir, while the other cylinder is fed with a sample of the solution under test, a constant level again being maintained, since the sample flows up the cylinder and over the weir. A small bore pipe is located in each cylinder, each pipe terminating in an open end, and these pipes are continuously fed with a small flow of air which escapes out of the open ends of the tubes and rises up through the liquid. By this means a pressure is obtained within each tube which is equal to the pressure exerted by the liquid at the open ends of these. The other end of each tube is connected, respectively, to the higher and lower pressure sides of a differential pressure measuring instrument so that, since the only variable in the measuring system is the specific gravity of the calcium chloride solution, the response of the instrument is a measure of this variable. An 'on/off' system of control can be used, which automatically diverts the calcium chloride solution to a steam heated evaporator when the specific gravity falls below a predetermined value.

Measurement of Temperature

The temperature measurement of both calcium chloride solution and gas at the inlet to and outlet from the washer is desirable, and for this purpose, mercury-in-glass thermometers in pockets are usually employed. For centralization of records, liquid expansion thermometers of the mercury-in-steel type are used, giving a temperature indication on a dial.

MEASUREMENT OF GASHOLDER HEIGHT

For water sealed gasholders of the usual type, reliance is still placed on the assessment of the holder height by counting sheets and rivets exposed, but it is becoming essential to have an immediate indication at a distance of available stock now that gasworks are increasing in size and many holders are remotely situated.

The majority of systems for transmitting the height of a gasholder over a distance are electrical. The general principle employed is that, by means of a wire attached to the crown of the holder, the rise and fall of the holder actuates a mechanical device which proportionately changes the resistance of an electric circuit. The electrical receiving instrument measures the change in resistance and registers this in terms of holder height.

The wire is maintained in tension by a counter-poise weight, and when a large holder is involved it is necessary to use compound pulleys and heavy counterpoise weights. A recent development, which removes this disadvantage, utilizes a spring loaded winding drum. No counterpoise weight is required, and a wire of lighter gauge can be used.

Another recent development in this field is a height measuring system employing a hydrostatic principle, and the variation of the pressure of the liquid at the base of the holder, caused by the rise and fall of this, is measured and registered in terms of holder height by a 'wet' type mercurial 'U' tube form of instrument or by a 'dry' type instrument of the pressure gauge form.

Of course, all these systems can incorporate electric transmission gear.

With waterglass gasholders of the piston type, gasholder volume measurement has always been employed as there are no outward visible means of assessing the situation. The holder indicators in these cases have usually consisted of cord and pulley systems actuated by the piston, the height being indicated on a large scale mounted on the external wall of the holder.

Warning systems for high and low limits are commonly incorporated into the height measuring equipment, particularly in instances where the holder is situated at a distance and not readily visible to the operating staff.

As a point of interest it may be mentioned that in the past a few special instruments were manufactured to record the direction of tilt of the piston of a waterless gasholder.

(*To be continued.*)

SALES CONFERENCE TRAINS

Each delegate to the Gas Sales and Service Conference to be held at the Heads of Ayr holiday camp, Ayr, from September 12 to 15, has received a form giving details of special trains, arranged by the Gas Council, to and from the Conference. The response from delegates, however, has not come up to expectations. Those who intend using the special trains are asked to complete the form and return it immediately to Mr. R. J. Gregg, Conference Organizer, Gas Council, 1, Grosvenor Place, London, S.W.1.

Trains will leave Euston station on Sunday, September 11, at 9.15 a.m. and 9.25 a.m., arriving at Heads of Ayr at 7.04 p.m. and 7.27 p.m. The second of these trains stops at Rugby, 11.28 a.m., Crewe, 1.20 p.m., Preston, 2.45 p.m., and Carlisle, 4.46 p.m.

A third class sleeper will leave Heads of Ayr on Wednesday, September 14, at 10.53 p.m., arriving at Euston on Thursday at 7.30 a.m. A second train leaving Heads of Ayr at 11.24 p.m. and calling at Carlisle, 1.50 a.m., Preston, 3.58 a.m., Crewe, 5.14 a.m., Rugby, 7.09 a.m., will arrive at Euston at 9.05 a.m.

CABMA REGISTER, 1955-56

The third edition of *CABMA Register, 1955-56, of British Products and Canadian Distributors,* has just been published, jointly by Kelly's Directories, Ltd., and Iliffe and Sons, Ltd., for the Canadian Association of British Manufacturers and Agencies, managers of the British Trade Centres in Toronto, Vancouver, and Montreal (size 9½ in. by 7½ in., 760 pages, bound full cloth, 42s. net, by post 44s.).

The new edition lists a greater number of entries than its two predecessors, which, as the Chairman of the Dollar Exports Council, Sir William Rootes, K.B.E., says in his foreword, 'is evidence of the *Register's* increasing usefulness and its acceptance as a standard work of reference.' The object of the Canadian Association of British Manufacturers and Agencies, for whom the *Register* is published, is to develop an ever greater market for British goods in Canada, and so stimulate the two-way flow of trade between the two countries, and it was to assist in this vitally important development that the *CABMA Register* was first published in 1953. The Register has now had two years of active use, and this third edition incorporates all the new information which has become available since the second edition was compiled and many of the suggestions put forward by its users for detailed improvements since the first publication of the Register.

The Buyers' Guide provides an alphabetical list of 4,000 British products available to the Canadian market, with their suppliers given under each heading. The French equivalents of these headings are set out in alphabetical order in a separate glossary. A directory of over 4,500 British firms gives details of their distribution arrangements in Canada; and these arrangement involve about 2,750 Canadian companies, some of whom supply further information in another section. Finally, special sections enable the Canadian buyer to identify products and their sources of supply when only their proprietary names or trade marks are known. The six sections are divided for easy reference by index cards, with reinforced tabs and containing instructions in French as well as English. The new issue is the outcome of co-operation of the following sponsoring organizations: the Dollar-Sterling Trade Council in Canada and, in the United Kingdom, the Dollar Exports Council, the Federation of British Industries, the National Union of Manufacturers and the Scottish Council (Development and Industry). Special introductory messages are included from the President of the Board of Trade and the Chairman of the Dollar Exports Council in the United Kingdom; and from the Chairman of the Dollar-Sterling Trade Council, Mr. James S. Duncan, C.M.G., and the President of CABMA, Mr. Lewis J. B. Forbes, in Canada.

SHERINGHAM MEETING

The eastern section of the Institution of Gas Engineers announces that its summer meeting will be held at the Grand Hotel, Sheringham, on September 19 and 20. The arrangements will be the same as those made for June 13 and 14, when the national emergency arising from the railway strike caused the cancellation of the meeting.

Report on Gas in France

Abstracts from *Journal des Usines à Gaz* by 'Ashton'

THE Salon des Arts Menager, opened this year on February 24, is something of an equivalent of our Ideal Home Exhibition. It is now the established custom to place the Pavillon du Gaz de France at the entrance. This year the emphasis was on the thermostat, the 'Robot of the Hearth,' 'facilitating considerably the everyday task, eliminating the task of watching over cooking, water-heating, the regulation of heating or refrigeration.' There was on show a cooker with central pilot automatically lighting all the burners, in the oven and at the griller as well as the hot plates, and automatically cutting off the gas if by accident it is extinguished. There was also an appliance combining a cooker with space heater modelled on the coal-fired range. The Editor 'salutes finally —a concession no doubt to the modern taste for bright colours —the still timid appearance of coloured enamelling.'

M. Le Guellec, President of Gaz de France, announced at the opening of an exhibition of gas films, his expectation of an all-round reduction in gas tariffs. 'Already in 1954, 500 communes, 350 of them in the Parisian region, have benefited by price reductions, rendered possible by the modernization of our means of production and distribution systems and also in consequence of improvements in our productivity. The year 1955 will see important developments of this movement.'

The Gas Turbine

Among technical papers, is a revised version of M. P. Renouard's study (to which we have already referred) of the gas turbine and its possible utilization in the gas industry. The paper is well illustrated by clear and informative diagrams. His general conclusion is that the use of the gas turbine can be envisaged in three main directions: Combustion turbines fired by liquid fuel for the production of supplementary power in the gasworks, with the advantage of low capital cost; similar machines associated with free piston engines for driving compressors for long distance gas transmission, with the advantage of a lower energy consumption compared with electrical driving; turbines utilizing the pressure of gas at the end of a transmission line, only in cases of high capacity and high pressures. The two systems of waste-heat recovery turbines at present under construction in Britain are described. M. Renouard does not think conditions in French gasworks, as they exist today, are favourable to the installation of the waste-heat turbine.

Underground Mains

MM. Touly and Changarnier describe a continuous automatic method for recording the electrical potential of an underground gas main to give warning of the presence of currents likely to cause corrosion either by electro-chemical action purely local or by vagabond currents. A 30 kilometre length of main was experimentally fitted with this arrangement. A line of double conductors was erected above the main and fitted with an indicator which showed variations in the potential of the main relative to the earth. 'The indications given by this apparatus are "pessimist," that is to say, they give a premature alert, but when the indications are "reassuring" one can be certain that at all points of control the value of the protective potential is at least equal to the minimum necessary.' A sample of the indicator chart is given to illustrate the readings.

Underground Gas Storage

The April number carries an important paper based on the report submitted by M. R. Fort, of the Research Department of Gaz de France, on the Technical Aspects of Underground Gas Storage. Gaz de France, seeking a solution of the problem set by high winter peaks in gas demand, decided to investigate this means of storing large quantities of gas which would permit seasonal regulation hitherto rendered impossible by the high cost of the conventional gasholder of adequate capacity. In America gas has been stored in exhausted natural gas fields, but as no such fields exist in France it was necessary to find water-bearing formations which might lend themselves.

The investigation was commenced in 1953 in collaboration with the French Institute of Petroleum. Among the favoured formations indicated by the latter was that at Beynes, near Versailles, and borings were undertaken in this region. The present paper is an extract of M. Fort's report on the investigations. It sets out the technical characteristics of underground gas storage. It is an adaptation of data acquired in petroleum technique to the particular case of the storage of gas in water-bearing strata.

A geological formation which is suited to the underground storage of gas must be porous and permeable. If the gas is to remain in place, this formation must be covered by an impermeable formation and must be in the form of an inverted basin, a condition which is, particularly, found at the summits of anticlines. Fig. 1, here reproduced, shows a typical formation in section and plan (*couche* = bed or strata, *ensellement* = col or saddle, *faille* = fault).

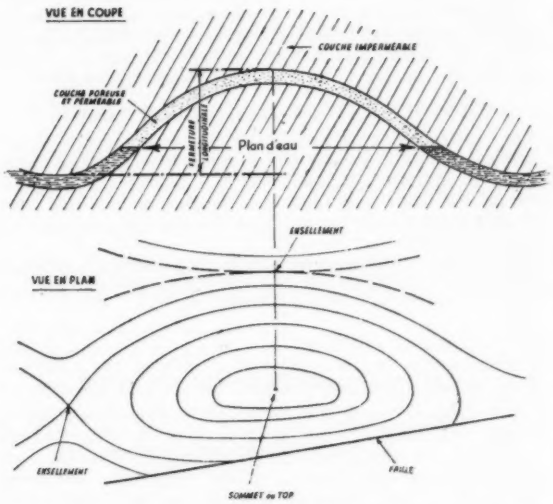


Fig. 1. Schematic drawing of a reservoir-formation. (April issue, p. 119.)

The subject is dealt with in considerable detail. Some of the conclusions are: It is to be noted that only a portion of the gas can be extracted for use (this may be as much as 90%)—a 'cushion' of gas must be left in, this cushion being the less as the 'water-drive' is higher, 'water-drive' being a somewhat indefinite term used by petroleum engineers to indicate the pressure of water induced by the lowering of the water table by the injection of gas. Conditions for recovering are most unfavourable at the end of the period—*i.e.*, when stocks are approaching exhaustion. The gas can be contaminated with dust or sand particles which must be removed. Storage, in this manner, of gas containing condensable hydrocarbons, or non-treated oil-gas, is inadvisable. The solvent action of the water may affect the composition of the recovered gas which will be saturated with water and may even carry water in suspension—a dehydrator is therefore necessary.

Gas in Algiers

M. E. Lécutier, Director of Gas Production and Equipment of Electricité et Gaz d'Algérie, describes the present state of the gas industry in Algiers. The first part of this paper appears in the April issue. We shall await the conclusion before abstracting it more fully.

The programme of renovation of the principal means of gas production is practically complete. The fourth gasworks, that at Alger-Gué, came into commission in 1953. For the next 15 years or so it will function with the third works, Alger-Hamma, which will take load variations with gasholder storage. These will constitute the whole of Gaz d'Alger with a capacity of 300,000 cu.m. (say 10 mill cu.ft.) per day with basic equipment capable of supplying at least 500,000 per day cu.m.

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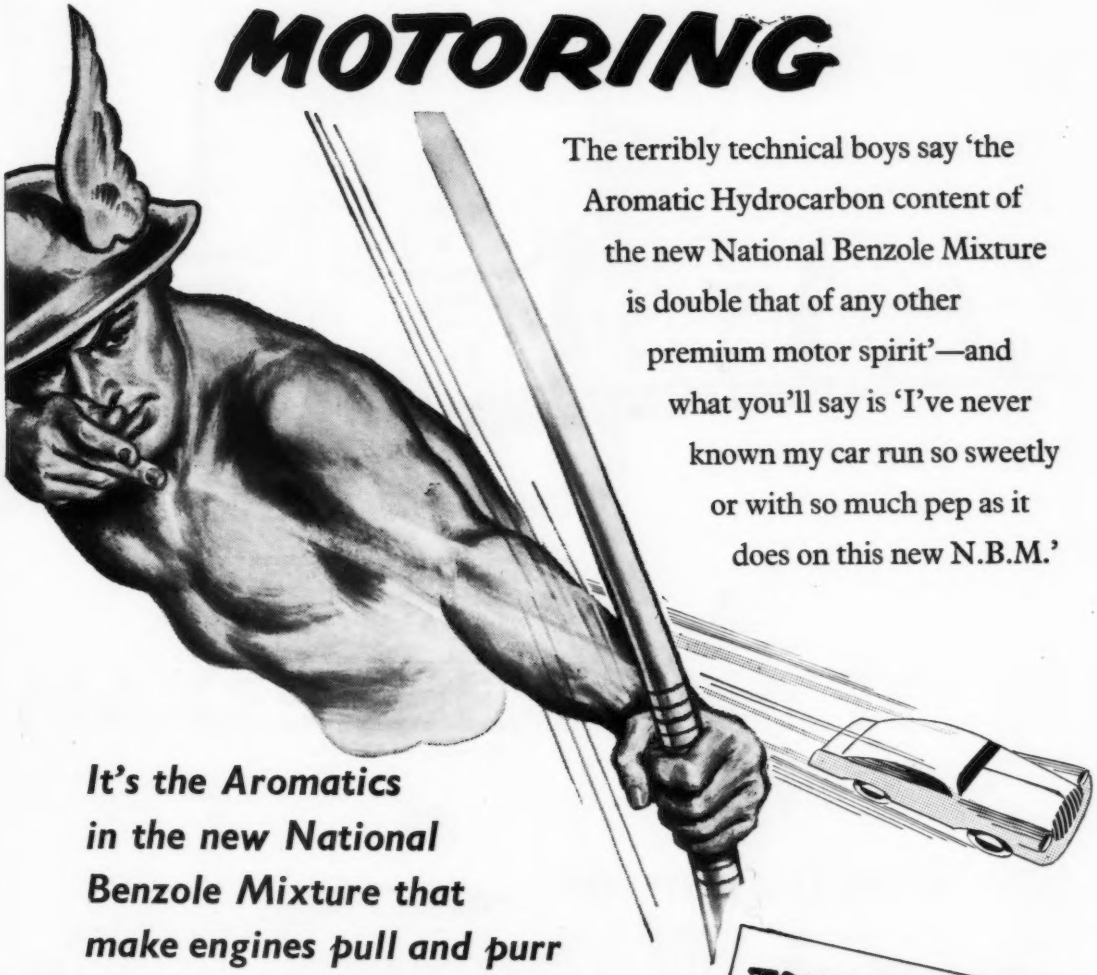

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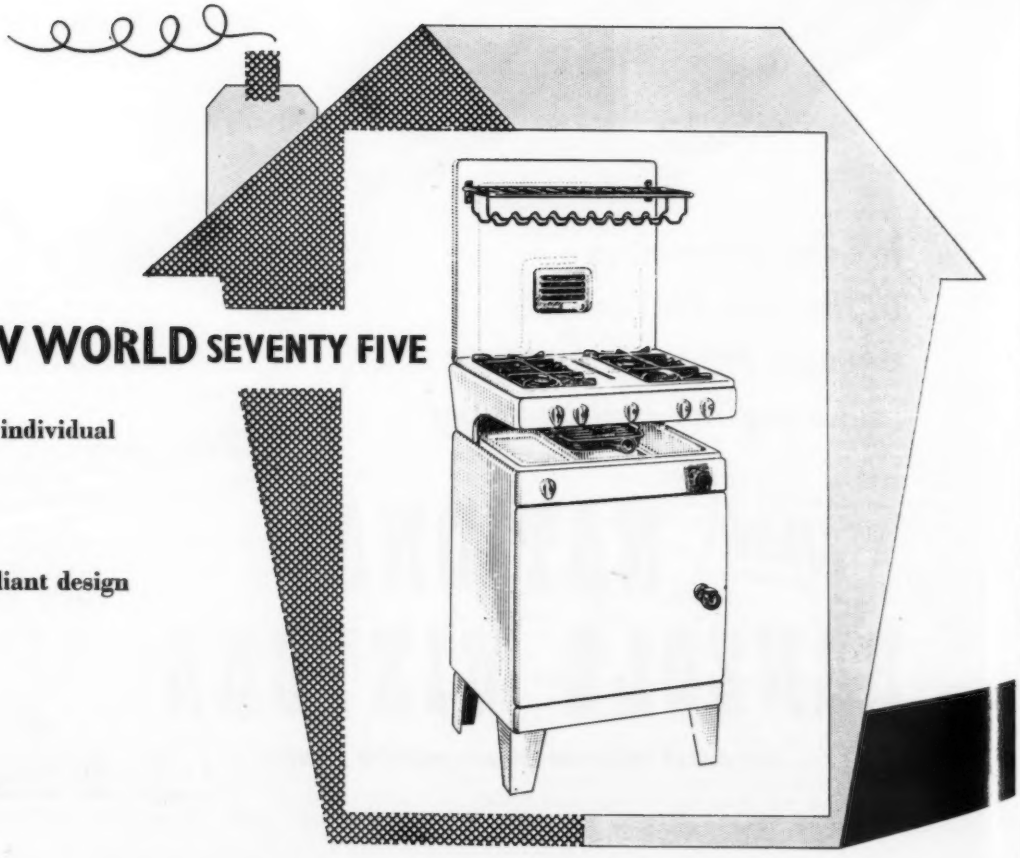

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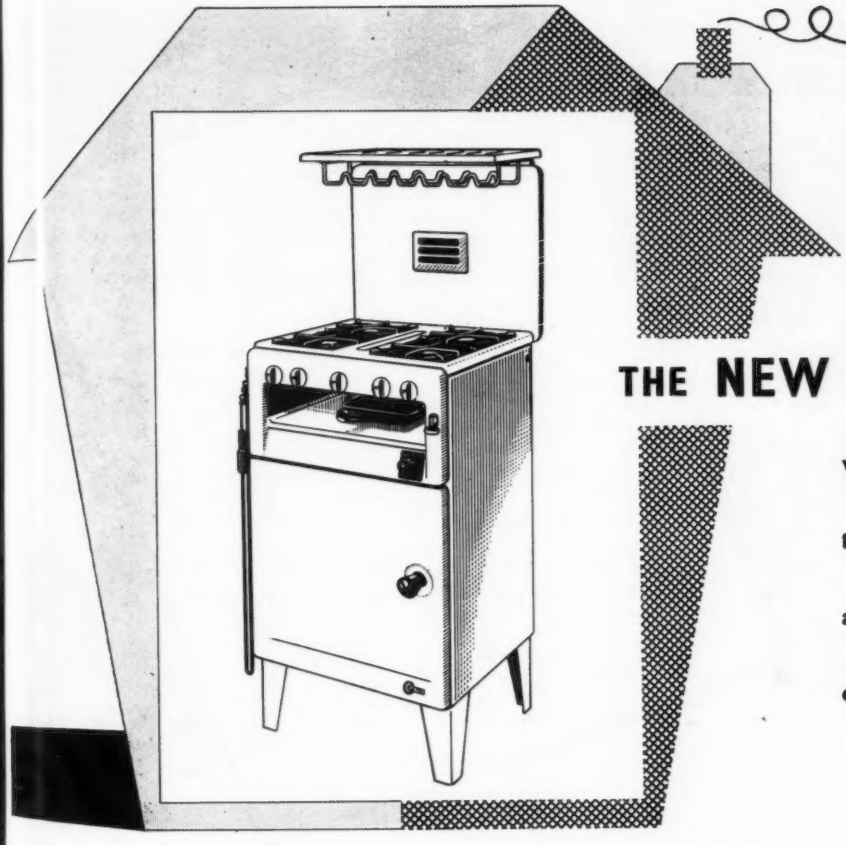

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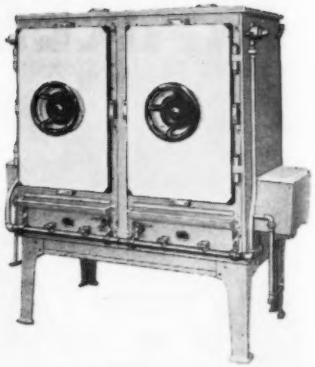

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Average consumption per consumer per day is 650 cu.m. (say 23,000 cu.ft.), but winter peaks tend to increase; the winter/summer ratio is now 2.8 and tends towards 3.5.

A point of interest is the mixture of coal sizes in charges to coke ovens to obtain a charge of maximum density in the manufacture of metallurgical coke. This was investigated to increase capacity for the winter peak. An example of this 'granulometric' mixing, shown in a triangular graph, is that of a coal with 1.8% moisture content separated into 'granulometric preparations,' a=1 mm. grain size, b=3.25 mm. and c=15-25 mm., the maximum density being obtained with 30% a, 20% b, and 50% c. This mixture resulted in a charge 2% in excess of the normal.

The new headquarters of L'Institut Francais des Combustibles et de l'Energie was inaugurated on February 18 (en presence de) M. Longchambon, Secretary of State for Scientific Research and Technical Progress. The scope of this body is practically that of the (London) Institute of Fuel, but its constitution is that, rather, of a collaboration of existing organizations covering parts of this ground. The gas industry is represented by M. E. Biard, Hon. Director of Gaz de France, past President of the Association Technique de l'Industrie du Gaz.

Coal stocks at the gasworks are normal, but they appear to require the importation, during the second quarter of 1955, of 180,000 tons from the U.S.A. This importation is viewed with some concern because of the high cost of freight which, in spite of a reduction of 20% from the maximum of the last few months, is still by no means negligible.

Coke Marketing Scheme for North West

The North Western Gas Board has devised a coke marketing scheme which provides a scale of remuneration to merchants according to the standard of service which they are able to provide. The scheme has been framed to achieve the following objects:

(i) To create a stable market for the sale of gas coke;

(ii) By introducing a simple but comprehensive price structure, to cover all sales of gas coke above ¾ in. in size, and by establishing uniform maximum selling prices in each of three zones, to ensure that everyone purchasing coke under like conditions may do so under the same maximum price schedules applicable within each zone;

(iii) To give an improved fuel service to the consumer;

(iv) To standardize the merchants' and the Board's maximum margins on the sale of gas coke.

In each of three zones there is a standard scale of maximum prices which will apply irrespective of the size of coke purchased or the point from which the coke is supplied. Maximum prices, which at present vary considerably, will thus be standardized over wide areas, and this will remove many of the existing anomalies and simplify the schedule of maximum retail prices.

The scheme provides for the standardization of merchants' margins throughout the area, and provision is also made for allowances to be paid to merchants who carry out extra services.

The Pulsometer Engineering Co., Ltd., is celebrating its 80th birthday. The story of the Company is published in the July issue of *Berkshire Life*.

Crypto, Ltd., one of the companies in the Lancashire Dynamo Group, is rebuilding its works at North Circular Road, London, to meet the need for extra space to cope with expanding business. This increase in accommodation is being undertaken in four phases so that it may be carried out without interference to production. The re-building will entail an expansion in works space, an additional office block, and a new canteen. The first section has been completed, and it is anticipated that the new works, giving a 50% increase in floor space, will be fully operative in the spring of next year.

DUBLIN SEEKS PRICE RISE

The Alliance and Dublin Consumers' Gas Company has applied to the Prices Advisory Body for permission to increase the price of gas by 0.75d. per therm, which in the Dublin area would raise the price from 21.75d. per therm to 22.5d. per therm, equal to 3½%. The Company has also applied for permission to pay the pre-war rate of dividend of 8%.

Mr. N. J. Robertson, General Manager of the Company, said the application was made with reluctance and was necessitated by increases in the cost of coal and in a lesser degree by increases in coal freights, wages of employees and rises in the cost of materials and expenses.

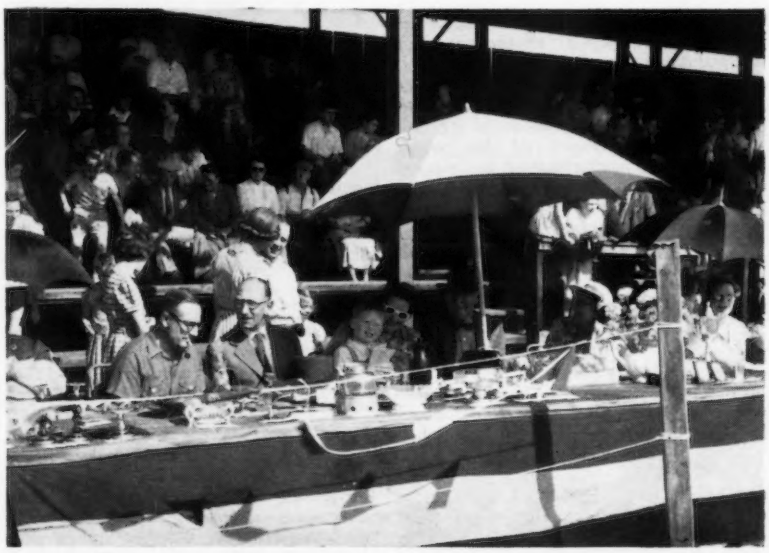
The estimated increase in the price of gas required, based on fuel consumption and sales in 1954 was:—Coal, 191,926 tons at 10s. a ton—£95,963; increased receipts from coke sales on 52,492 tons at 10s. per ton—£26,746. This was a net increase of £69,217, equivalent per therm of gas sold at 0.82d.

Dealing with the request for permission to pay the pre-war rate of dividend, Mr. Robertson said considerable discontent had been voiced by stockholders at recent meetings of the company, not only because the dividend paid was lower than pre-war, but also because no adjustment in the rate had been remitted as in the case of wages and salary levels to offset the reduced value of money. The maximum dividend permitted of 7½% per annum was a hardship.

Mr. Justice Lavery, who presided, said the Prices Advisory Body would report to the Minister for Industry and Commerce.

TEES-SIDE SPORTS

The annual sports meeting of the Tees-side Division of the Northern Gas Board was held on July 16 on the Redcar racecourse. This was the fifth annual meeting and it is still the only event of the kind in the Board's area. A special train picked up employees, starting from West Hartlepool and calling at other towns in the Division, and carried them to Redcar. Coaches were used from other points. No fewer than 1,300 people were present for the various events, which were organized on a unit basis. The 'John W. Pallister' Trophy was won by the Hartlepools Unit and the prizes were presented by Mrs. J. R. Bradshaw and Mr. Bradshaw, member and formerly Deputy-Chairman of the Board.



The photograph shows seated from left to right, Mr. L. A. Garratt, Mr. John W. Pallister, Mrs. J. R. Bradshaw, Mr. J. R. Bradshaw and Mrs. Pallister.

Fuel Research Board's Annual Report

MUCH of the work of the Fuel Research Station at Greenwich during the period covered by the annual report of the Fuel Research Board for 1954 was devoted to problems concerning the production of free-burning coke for domestic heating and the study of the various ways in which the heat from a solid fuel burnt in domestic grates and stoves is used or wasted. Another important investigation concerned the recovery of germanium from coke, tar, and liquor produced by the carbonization of coal. Attention was also paid to smoke elimination from forced-draught hand-fired boilers, boiler availability, coal firing for gas turbines, the gasification of low-grade fuels, the production of ash and chemicals by the Fischer-Tropsch synthesis, flow properties of residual fuel oils, the removal of sulphur compounds from flue gases, and the chemistry of coal. The Report, which includes the Report of the Director of Fuel Research, is published by the Stationery Office at 3s. (3s. 3d. by post).

On the question of domestic coke it is pointed out that there are still something like 12 mill. old-fashioned open fire grates in use in this country, which are incapable of burning ordinary gasworks coke satisfactorily. Since a large proportion of domestic heating during the winter will have to continue to depend on solid fuel for many years to come, the production in much larger quantities than hitherto of smokeless solid fuel that will burn well in ordinary grates would make a substantial contribution to the reduction of domestic smoke. Work at the Station has now shown how such solid fuel can be produced in ordinary gasworks equipment by carbonizing weakly-caking coals, of which large reserves are available.

Boiler Availability

Investigations during the year on the mechanism of formation of bonded deposits on the outside of the tubes of water-tube boilers fired with coal or oil have provided an interesting example of the value of radioactive tracers. Many of these deposits are cemented by sulphates or bisulphates of the alkali metals; apart from reducing the rate of heat transfer and causing periodic interruptions in the running of the boiler for their removal, they are also responsible for corrosion of the tubes at high temperatures. It is supposed that the alkali metal is volatilized from the fuel bed as chloride which then reacts with the oxides of sulphur in the flue gas to give sulphates. Evidence has been obtained that the reaction is catalysed by iron oxide on the tubes or carried forward in the flue gas. Experiments made with flue gas containing ordinary sulphur dioxide mixed with sulphur trioxide labelled with the radioactive sulphur-35 have shown that under these conditions most of the sulphate is formed from the sulphur dioxide. Thus the formation of the sulphates would not be prevented by reducing the concentration of sulphur trioxide in the flue gas, but conditions might be improved if some means of reducing the catalytic activity of the iron oxide could be found.

Recovery of Sulphur from Flue Gas

Work on the development of a process for removing oxides of sulphur from flue gas and converting them into ammonium sulphate and sulphur has been in progress for several years at the Fuel Research Station and has reached the stage of pilot plant treating 25,000 cu.ft. of flue gas per hour.

The Central Electricity Authority now considers this process to be sufficiently promising to justify the erection of a large pilot plant at one of its generating stations to treat about 2 mill. cu.ft. of flue gas per hour. Operation of this plant should give the data required for the design of a full-scale plant and for making a more accurate estimate of probable cost. The work on this process at the Station provides a convincing illustration of the value of the simultaneous development of pilot-plant trials and fundamental investigations in the laboratory. In this instance measurements on the gas-solution equilibria have not only explained the results obtained with the small pilot plant at the Research Station, but have also shown that the only way to increase the efficiency of removal of sulphur dioxide from the gas by this method is to divide the washing process into two or more stages.

Domestic Heating

The calorimeter building is yielding valuable information on the various ways in which the heat from solid fuel in domestic appliances is used or wasted. It is thus giving more accurate data than hitherto available on the factors affecting room-heating efficiencies with appliances of different types. For example, with the simple open fire, it has been found that the efficiency with which useful heat is given to the room, directly as radiation and indirectly by convection, increases as the rate of burning is reduced; the efficiency is also increased by the use of a chimney throat restrictor which cuts down the rate at which air is drawn up the chimney. With coal as the fuel, throat restrictors can also reduce the amount of smoke issuing from the chimney by as much as one-third.

For the accurate measurement of the efficiency of stoves, the calorimeter building is indispensable. Work on the effects of leaks through badly fitting doors of openable stoves has shown that such leaks cause appreciable reductions in efficiency, which may be as high as one quarter. It has also been found that one model of stove when closed burns coal with as high an efficiency as it burns coke, whereas usually with such stoves the efficiency with coal is lower than with coke. Investigations are being made to find the reasons for the differences in relative efficiencies with coal and coke for different stoves, with a view to defining the conditions leading to highest efficiencies and minimum smoke emission with coal.

Gasification of coal fines and dust is, says the Report, of great interest, but there is also a special need for a process capable of using fine coke breeze. Between 15% and 20%—about 2½ mill. tons a year—of the coke produced at gasworks is in the form of breeze and this amount will increase if it becomes necessary to carbonize less suitable coals. A process using coke breeze for making the producer gas required for heating the carbonization plant could release a corresponding amount of large coke as a smokeless fuel for domestic heating.

Two methods of gasifying small sized or finely divided coke or weakly-caking coal are being investigated at the Station. In the first, the fluidized solids method, a bed of the fuel is maintained at a high temperature in a condition in some ways resembling a boiling liquid by passing steam through it at such a rate that the individual particles are kept in suspension but are not carried off by the gas. Heat can be transferred to it more efficiently than to a static bed of the same particles. In the second method of gasification that is being tried, fuel is borne by a stream of air or steam which sweeps it through a cyclone chamber where a high temperature is maintained and where gasification occurs.

Coal Firing for Gas Turbines

Work on problems of combustion that arise when solid fuels are used for providing the energy for gas turbines has been continued with the objects of developing combustion chambers for coal-fired gas turbines and of obtaining more fundamental knowledge on the combustion of solid fuels that may be applied to many other combustion or partial combustion (gasification) problems. During the year under review attention was concentrated on the problem of so arranging the detailed design of the Fuel Research Station straight-through combustion chamber that deposits of ash are not formed in it during operation. Considerable success has been achieved and a combustion chamber of this type is being built at the National Gas Turbine Establishment to work under pressure and to be tested when coupled to a gas turbine.

Germanium from Coal

The increasing importance of germanium to the electronics industry has led to a study being made of the way in which germanium present in coal becomes concentrated in certain of the by-products during processing or combustion of coal. It is hoped to discover all possible sources of material rich in germanium and to discover ways of modifying processes and plants to increase the amount of germanium which can be recovered.

The distribution of germanium in the coke, tar and liquor produced by the carbonization of coal is being investigated.

It was found that about 90% of the germanium present in the coke when it was fed to the producer was volatilized

but only a proportion of this volatilized germanium was retained in flue deposits. It is likely that considerable quantities of germanium pass out of the chimney stack in the form of a very fine dust.

The most serious problems of air pollution are those which arise from the use, or misuse, of fuels; they are therefore closely connected with many aspects of the work of the Fuel Research Station. Accounts are given of investigations on the production of more-freely-burning coke as a smokeless fuel for use with domestic fire grates, on the removal of sulphur compounds from flue gas, and on the reduction of smoke emission from boilers and furnaces fired with coal or oil. All these programmes are concerned directly with the abatement of air pollution. In addition the work of improving the efficiency of industrial boilers and furnaces and domestic heating appliances has an indirect bearing on the subject since it aims at the use of less fuel and therefore the production of less smoke for a given amount of useful heat. An account is given of the work on the measurement of air pollution and the development of methods and instruments for the measurements, and of investigations of the factors affecting dispersion of the pollutants. The measurements discussed include those made by local authorities and other organizations throughout the country under the D.S.I.R. co-operative scheme organized by the Fuel Research Station, and those made by the Station for special surveys of pollution. Collaboration with the Medical Research Council and other medical authorities in investigations of the effects of pollution on health is also described.

Data on the concentrations of smoke and sulphur dioxide that were obtained during the dense fog that covered London and other parts of the country at the beginning of December, 1952, proved valuable for medical and other investigations. The measurements, which were made by the normal daily operation of standard volumetric instruments by the Station and by various co-operating bodies showed that there were unusually high concentrations of these pollutants, expressed as averages over periods of 24 hours. No direct information was available on the concentrations of other pollutants, nor was information obtained on the changes in concentration of smoke and sulphur dioxide within each period of 24 hours. Plans were therefore made to obtain information which would be more detailed in both these respects during any future severe smog. As a first step the scheme has been limited to the London area where it can be supervized directly by the staff of the Station.

FRENCH TECHNICIANS SEE ROCHDALE PROCESS

Passing beneath the pipes that bring the carrier gas to the 'Rochdalised' retorts at Partington are (left to right) Mr. W. Hodkinson, Chief Technical and Planning Officer, North Western Gas Board, Pierre Schuller, Lorraine Collieries, Metz, Patrick Beaugrand, Acquitaine Collieries, Toulouse, and Roger de la Rue, Construction de Four.

From three widely separated centres in France, Metz in the East, Paris in the North, and Toulouse in the South, a party of technicians interested in the possible application of the Rochdale process to the carbonization and briquetting sides of the French coal industry recently flew to Manchester to see the process at work at the North Western Gas Board's Partington plant. They were Messrs. Pierre Schuller, of the Lorraine Collieries, Roger de la Rue, of the Societe Construction de Four, and Patrick Beaugrand, of the Acquitaine Collieries. The party were met on arrival in Manchester by Mr. D. P. Welman, Chairman, North Western Gas Board, and Mr. A. Henshall, Deputy Chairman, supported by Mr. S. G. Deavin, Secretary of the Board, Mr. W. Hodkinson, Chief Technical and Planning Officer, Mr. F. Litler, Deputy Chief Technical and Planning Officer, Mr. T. Nicklin, Production Engineer, and Mr. Walker Smyllie, Public Relations Officer. After a day spent inspecting the Partington plant the party flew back to France from Ringway Airport.

LIVERPOOL'S PRIZEWINNING STAND

General view of the Liverpool Group, North Western Gas Board, stand, which was awarded the Gold Medal for the most meritorious trade stand at the Liverpool Show. As in previous years, the stand was divided into two sections, one devoted entirely to gas appliances for domestic and agricultural uses, and the other to a demonstration theatre where continuous demonstrations were given by home service advisers. There was a record attendance on the three days of the show and the demonstrations were well attended. Mr. D. P. Welman, Chairman of the Board, sent a congratulatory telegram to the Group display department which designed the stand.

After Negotiations with the East Midlands Gas Board, it has been resolved by Chesterfield Borough Council that tenants of council houses may, if they wish, have gas refrigerators installed in their homes, on condition that the Council is not called on to bear any charge.

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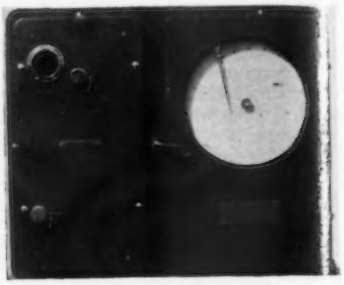

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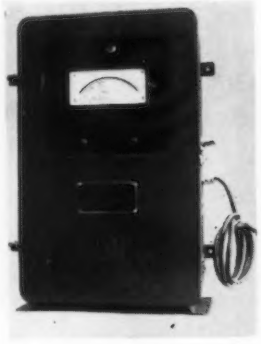

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Ascot Stand Design Winners Receive Prizes

AT an informal presentation ceremony at the Building Centre, London, on July 26, the Earl of Limerick, Chairman of Ascot Gas Water Heaters, Ltd., handed cheques to the winners of the competition to design the Ascot stand for the Building Trades Exhibition in November.

Mr. Dennis E. Pugh, A.R.I.B.A., a 27-year-old London architect, received the first prize of 200 guineas for his design, of which his own scale model and plans were exhibited at the Building Centre. Also on show were the plans of the second and third prize winners, respectively Mr. Hugh R. Brady, B.A., (ARCH.), A.R.I.B.A., and Mr. W. F. Mullins, A.R.I.B.A., A.A. (HONS.) DIP.

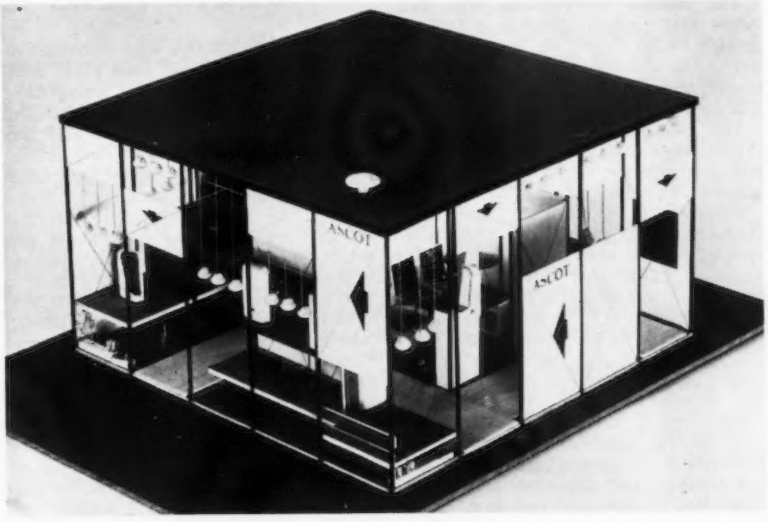
Mr. Brady, the second prizewinner, told the 'GAS JOURNAL' that his wife, coincidentally, had reached the finals of the 'Bride of the Year' Contest in the North Thames area. (This means she will receive at least £25 prize money or go on to the Gas Council competition.)

Mr. Pugh whose design was judged the best of the 160 entries has been on the staff of Architects' Co-partnership at 44, Charlotte Street, W.1, since 1951. He qualified as an Associate of the Royal Institute of British Architects last year after studying at the Northern Polytechnic.

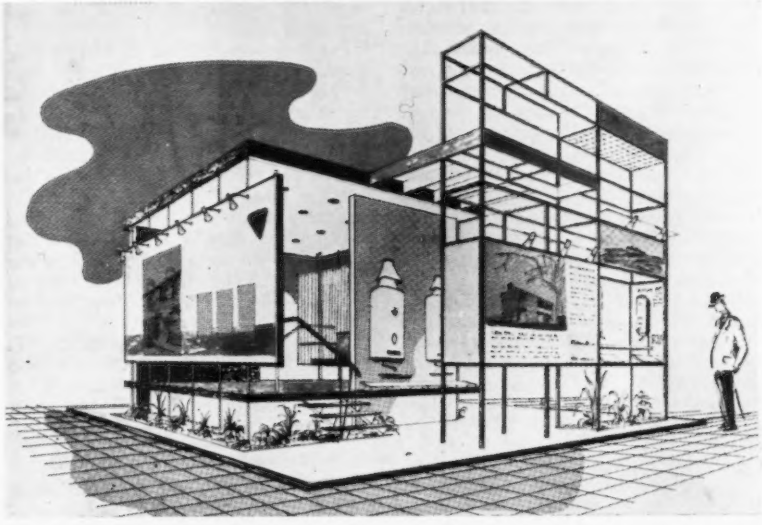
The subdued white, black and blue colour scheme and the extreme simplicity of Mr. Pugh's design represents a novel approach to the ever-present problem of attracting the attention of visitors at any exhibition.

'Most stands at present-day exhibitions are brightly coloured', he maintains. 'For this reason I feel that my neutrally-coloured design will, by contrast with its neighbours, catch the eye far more forcibly than it would in any scheme of bright colours. As for the design itself, the basic motif of the exterior is the famous Ascot triangle trade-mark'.

Left to right: Mr. W. F. Mullins, third prize winner; Mr. D. Pugh, first prize winner; the Earl of Limerick, and Mr. H. R. Brady, second prize winner. Photograph taken at the prize-giving reception.



The winner of the first prize, Mr. Dennis E. Pugh, made this scale model from his winning design. The photograph shows the front elevation which will open on the main gangway at the exhibition in November.



A perspective view of the design which won second prize for Mr. Hugh R. Brady. The front of the stand is on the right of the photograph.

Following the Demonstration of 'Analmatic' automatic laboratories at the British Instrument Industries Exhibition at Earls Court, one of these laboratories, which was designed and built by Baird & Tatlock (London), Ltd., in co-operation with A.E.R.E., Harwell, will be shown at the Geneva Atomic Energy Conference. The instrument is constructed for the continuous analysis of liquors containing uranium. It can be seen on the stand of the United Kingdom Atomic Energy Authority under the title 'Special Instrumentation for Atomic Research.'

GAS CONSULTATIVE COUNCILS

East Midlands Labour Shortage

Labour shortages were mentioned by Mr. Sydney Smith, Chairman of the East Midlands Gas Board, at the annual meeting of the East Midlands G.C.C. in Nottingham, on July 5.

While the total labour force of the Board dropped slightly from 11,328 at the beginning of the year to 11,209 at the end of March 1955, it is important to note that the number employed on mainlaying, service laying, and sales and service increased by 113, and those engaged on processes of gas production decreased by 256. This deployment continues the trend of previous years—from production to distribution and consumer service.

The number of gasfitters was still below that needed, although it had increased by 70 during the year. Arising out of this shortage, a new class of employee, designated 'district maintenance man,' was introduced in December, 1954.

The number of registered disabled persons employed at the end of the year was 386, representing 49 more than the statutory minimum required.

Results of intermediate and final examinations in gasfitting at the beginning of the year were disappointing. Mr. Smith explained that this was due to the raising of standards and stiffening the examinations. Further intensive training has been given during the year and it is hoped that the results of the recent examinations will show satisfactory improvement.

Referring to gas charges, Mr. Smith said that the reduction of 10% on all gas used by 'constant-load' consumers has proved most successful, to such an extent that a number of firms have found it worthwhile to rearrange their production processes to take advantage of the cheaper gas.

Total cash value sales of appliances at £3,464,000 was more than 30% higher than the record figure for the previous year. The lifting of hire-purchase restrictions in July, 1954, produced a rush of orders, but the permanent effects were comparatively small, except in the case of gas-electric washing machines, the sales of which levelled off at about double the previous level. Reintroduction of restrictions in February offset to a large extent the benefits previously achieved. Credit for a successful year's trading must therefore go to the efforts of the sales and service staffs.

Rapid progress has been made on the laying of the 'backbone' main and other grid mains in readiness to accept the new supplies of coke-oven gas, and on mains to new housing estates. Approximately 427 miles of new mains were laid, an increase of 68 over the previous year.

Of plans for future development, Mr. Smith pointed out that in Sheffield, in order to relieve the normal distribution system of some of the very large supplies of gas to the steel industry, a programme of special industrial-supply mains has been developed, and certain sections of these are now being laid.

In the Lincolnshire Division, following the completion of a contract with John Lysaght's Scunthorpe Works, Ltd., for the supply of coke-oven gas, a scheme has been developed for distributing this gas through a grid system bounded by Scunthorpe, Grimsby and Skegness, known as the North-Lincolnshire grid. The Scunthorpe to Brigg and Kirton-in-Lindsey section has been completed.

The Board has not yet acquired a site at Sheffield for coke-oven gas producing works. Urgent consideration has, therefore been given to the installation of the third section of the new horizontal chamber oven plant at Neepsend works, Sheffield, and of extensions to the new intermittent vertical chamber oven plant at Car House works, Rotherham. Consideration is being given to adding to the carbonizing plants at Doncaster. Search for the new site will continue.

Some additional gas is expected during the year from the Harworth coke ovens of the East Midlands Division, N.C.B.

'No News is Good News'

The North Thames Gas Consultative Council, which will not meet again until September 29—emergencies excepted—had a light agenda for its pre-vacation meeting at Westminster City Hall on July 28. In these days of rising prices, however, it might almost be described as an 'extraordinary' meeting. When, under 'Any other business', a member asked if there was any news about gas prices, the Chairman, Mr. E. Bayliss, replied that 'No news is good news'. But, it was recalled, Mr. Michael Milne-Watson, Chairman of the Gas Board, who earlier in the year had obtained the Council's endorsement of a 1½d. rise, had warned the Council that he might have to come back for more. 'All I can say', said the Council Chairman, 'is that, as the Chairman of the Board told us, any further increase in the cost of coal will have to be considered in due course'. Responding to a further expression of pleasant surprise, Mr. Bayliss commented, 'There is no indication; I am hopeful', and as the meeting closed, he said that if necessary the Council would be summoned before the next appointed date.

Publicity was referred to in two connections—editorial and advertising. Following interviews with the Chairman and Secretary, the *News Chronicle* had published an article by Elizabeth Gundrey on the work of consumer councils in general and the North Thames Gas Consultative Council in particular. It was not very complimentary to electricity consultative councils which do not, at any rate to the same extent, welcome the Press to their meetings, but it referred to many helpful things accomplished by this particular Council.

It was also mentioned that Mr. W. Elliott, Secretary of the Council, had addressed the Kensington Rotary Club on the work of the Council, for which high appreciation had been expressed.

Advertising Pays

A lady member raised the question of the Gas Board's expenditure on advertising and expressed some doubt as to its real value. The Chairman said that in most recent campaigns the Board had joined with the South Eastern and the Eastern Gas Boards, and all three had shared the cost. They had checked the value of advertising by comparing results of campaigns in respect of certain cookers or other appliances with and without advertising in the Press, and the difference in sales had been 'most marked'.

The reports of the four District Committees of the Council were mainly formal. Three of the four recorded visits to gasworks within their respective districts. In the case of the Metropolitan District Committee, only the Deputy Chairman, one member, and the Secretary turned up, and in the absence of a quorum only provisional business was dealt with. True, the Chairman of the Committee was ill, and apologies were received from five members, but in thanking Dr. A. E. Haffner and Mr. C. P. N. Cox, who had shown the three visitors round the Fulham works, the Deputy Chairman deplored the poor attendance which, he said, was a poor compliment to the Board's staff.

Next Winter's Coke Difficulties

Referring at the previous meeting of the Council to coke orders and supplies, the Chairman invited members to make it known as widely as possible that supplies would be even more difficult during the coming winter, owing to the coal shortage and for other reasons; it was therefore more than ever necessary for customers to order early.

A letter was received from the Gas Board replying to the Council's suggestion that notices should be displayed in all showrooms in the early autumn to remind coke consumers to order early. In accepting the suggestion the Board explained that last autumn a postcard reminder had been sent to every coke consumer on the Board's books, and this had evoked some response. A major difficulty was that many customers had quite inadequate space for coke storage.

In a discussion it was suggested that local authorities and other property owners might arrange for local coke

dumps. Local Press advertising was suggested, but this, said the Chairman, had already been done. One member said many consumers fared better last winter by taking weekly deliveries from local merchants.

Accident Prevention

In considering measures for preventing accidents with gas appliances in the home, particularly among aged and infirm people, the Council commended the issue of an informative leaflet by the Gas Council, which was available to all social workers and organizations; those concerned were invited to apply to the Gas Council direct for free copies.

Mrs. Topping, Deputy Chairman, referred to a letter from the Women's Co-operative Guild expressing concern about the number of accidents in the home and urging that there should be frequent inspection of appliances and replacement of obsolete appliances free of charge. The representation had been passed to the Board as it was felt that the best way of dealing with it was for a senior officer to explain the Board's practice and policy to the members of the Guild, and it was understood that the Board was now awaiting an appointment.

Thirteen representations and complaints were reported to have been dealt with.

A Temple Fortune restaurateur had questioned an account for £9 9s. for relaying the gas service pipe to his restaurant. He stated that other nearby premises had not been charged for similar work. The matter was referred to the Board, which reported that the charge was correct. In the case of the other premises, the cost of the re-laying was divided between several flats above the shops and thus came within the free allowance of 30 ft. per supply allowed by the Board. The position had been explained to the consumer, who was satisfied and had paid the account.

Payment of Arrears

From Rochford a consumer complained that the Board was threatening to remove her hired gas cooker without reasonable notice. Investigation revealed that the cooker had been installed on hire at 1s. 2d. per week since 1947 and that only 10s. plus rebates from the meter had been paid. The arrears now amounted to £5 17s. 1d. and the Board felt that this position could not continue. It had therefore threatened to remove the cooker in order to compel the consumer to face up to her liability. She had since been seen by a senior officer of the Board and had agreed to pay off the arrears at the rate of 5s. per week.

A Highgate property owner had sought advice on the question of obtaining a reduced rate for servicing a large number of gas appliances in her house. She had recently converted the premises into six flatlets each with a cooker, gas fire, and sink water heater, and in addition had her own flat. She contended that the Board should be able to offer reduced charges for servicing so many gas appliances at the same time in one house. The question had been referred to the Board and it had agreed to undertake the servicing on a 'time and materials' basis instead of a standard charge per appliance.

Not Extravagant

The Southall branch of the National Union of Railwaymen alleged 'extravagant expenditure' by the Board in remaking and re-lighting the private road leading to Southall gasworks. It was contended that the standard of renovation was unnecessarily high and the expenditure not justified at a time when an increase in the price of gas had just been announced.

The letter had been referred to the Board, whose reply stated that the remaking of the road was rendered necessary by the heavy traffic in and out of Southall gasworks. The old road was narrow and dangerous and the surface had deteriorated. Before the new road was designed a census of traffic was taken over a long period to show the number of vehicles using it, the gross weight, and the intensity of traffic at different times of the day. The road was therefore designed to carry the load which that census showed it to be required to carry. In the interests of safety of vehicular traffic and the many pedestrians and cyclists using the road, the lighting was designed to deal with the intensity of traffic that the census had shown to exist with particular reference to the early mornings of the winter when coke traffic into and out of the works was at its height.

Soaring Costs in Eastern Area

Sir John Stephenson, Chairman of the Eastern Gas Board, told the Eastern Gas Consultative Council on July 25—as briefly reported last week—that the price of gas would be increased by 2d. a therm from August 3. The commodity rate of the domestic tariff would be increased from 70% to 72½% of the appropriate district flat rate, the standing charge under this tariff remaining unchanged. The second block of the bread baking block rate would also be increased by 2d. a therm. No change would be made in the discounts under the non-domestic tariff. Sir John said that the effect of these increases would be that all consumers would pay 2d. a therm more for their gas and the average domestic consumer would pay about another 4½d. per week.

Sir John said that he viewed with great disappointment and regret the necessity of having to meet the Council on the subject of gas prices only a year after the last increases. Until last year the gas prices had remained unchanged during a time of continually rising costs for a period of two and a half years. It had been hoped 12 months ago that a further period of stability in gas prices could be achieved. The Board was now compelled to increase the price of gas again. The Board, faced as it was with the crippling increase in the cost of its basic raw material, coal, had no choice but to pass on that increase to the gas consumer. He felt, however, that he must on the one hand illustrate to the Council not only the extent to which this increase in the cost of coal played havoc with the Board's economy and plans, but on the other hand to assure the Council that, faced with a burden as large as this, the Board continued with the single purpose of giving to its consumers a first rate supply of gas at the cheapest possible price. The Board still claimed that its price remained at the lowest level that present circumstances allowed.

Increased costs which had arisen since the price of gas was last varied amounted in total to nearly £2 mill. He emphasized that they had all arisen within the 12 months since last August.

By far the largest single item in this additional bill was the increase in the cost of coal. This was 18% on the pithead prices and was equivalent on average to 12s. 5d. a ton in the Eastern Gas Board. This additional bill amounted to £1,117,000. On top of this was a further £180,000 in respect of increased rail and seaborne freight rates on coal. Coal represented 41% of the Board's total costs and the average cost per ton delivered to gasworks in the area remained the highest of any area board. Due to the great distance from the coalfields and the high percentage of railborne supplies the burden of the increase in freight rates was proportionately greater. The cost of transporting coal into the area during 1955-56 would be in the region of £2½ mill., the equivalent of approximately 4½d. per therm.

Sir John referred to the recent debate in Parliament which mentioned the use of oil in the gas industry. He said that it was along these lines that the Board had been thinking for the last year or two. Oil gasification plants were soon to be erected at Ponders End, Luton, and Thetford, and others would follow. The Board felt sure that the future of the industry and indeed of the nation lay in the bold pursuit and use of new techniques.

The wages and salaries bill, in following the national trend, had increased by nearly £400,000 per annum since the last increase in price. Interest charges due to the increases in the bank rate and the interest on additional capital had gone up since last year by £144,000 and the depreciation charges by £106,000. It was estimated that the raising of interest rates on temporary borrowings alone would cost the Board an additional £50,000 a year.

The Board could, however, look for an increase in revenue from coke, particularly in the domestic fuel market. There was no doubt that there would be an increase in the price of coke and, allowing for what might be the maximum increase, it was felt that the net additional costs arising since the last price increase would be in the region of £1,200,000. In this respect the Board's plans

to budget as far as possible to balance its expenditure with revenue had not been entirely unsuccessful. The adjustments to the Board's gas tariffs were to be made to meet a forecast deficiency of £924,000 for the year 1955-56.

Sir John assured the Council that in fixing the new prices the Board had not departed from the general policy which had been followed over the past six years of fixing the price of gas as low as consistently possible with their statutory obligations. Indeed the Board had been trying, but fighting a losing battle, to fix the increase at something less than 2d. Unfortunately, however, the tide of costs was running very much against them and it was not inconceivable that there might have been a case for an even greater increase.

A pointer to the success of the Board's policies was that the total gas sold in the last year had increased by 5.37%. Sales to industrial consumers were increased and—a very significant achievement—the fall in the average consumption of gas by domestic consumers had been arrested. The Board endeavoured to run its affairs on the best commercial lines. It aimed to make no profits and had no hidden reserves. Both the Board and the Council had the same aim—to serve as well as they possibly could the gas consumers of the Eastern Gas Board.

Mr. C. H. Frewer proposed that the proposals to increase the price of gas should be approved by the Council. In seconding, Alderman F. Doggett, of Cambridge, asked that full publicity should be given to the two-part tariff so that advantage could be taken of it. Alderman W. W. Farthing, J.P., from Chelmsford, asked if financial help might be obtained from the Government for the erection of new gasworks in the five new towns in the area and also to subsidize the cost of coal transport which was higher than for any other board owing to the distance of the area from the coalfields. Sir John said he must reserve his reply on that matter.

Councillor E. Barrett (Bishop's Stortford), proposed, as an amendment, 'that this Council representing the numerous gas-consuming public, should impress on the Ministry of Fuel and Power the immediate necessity of solving the problem by which a very large quantity of coal remains in the pits instead of being available to the public on the pit surface.' There was no seconder and the amendment was dropped. The proposals to increase the price of gas were approved by a vote of 16 to one.

Pottery Makers Protest

A protest by the British Pottery Manufacturers' Federation against the West Midlands Gas Board's method of applying the increased gas charge of 1¼d. a therm was considered by the West Midlands Gas Consultative Council at its meeting at Stoke-on-Trent on July 18. After receiving a deputation from the Federation the Council announced that the protest would be forwarded to the Gas Board 'for favourable comment'. Mr. G. Maddock, spokesman of the deputation, submitted a memorandum on behalf of the 159 members of the Federation.

The memorandum referred to a special agreement entered into by the Gas Board and the Federation members for a scaled reduction of price for gas consumption in excess of 25,000 therms per quarter, and stated: 'The recent increases have seriously reduced the benefit of that special agreement. The consumer of 45 therms per quarter pays only 12.5% more, whereas the consumer of 100,000 therms a quarter is faced with an increase of 20%'. Mr. Maddock said the pottery industry was gravely disturbed by the severity of the increases. The total additional cost to the industry was estimated at upwards of £130,000.

Earlier the Council had approved a proposal by the West Midlands Gas Board to increase the price of gas by 1d. per therm—with a variation of three-farthings per therm in North Staffordshire where an extra farthing a therm is paid under the existing tariff. The Council also approved a rise of 18s. 4d. a ton in coke prices. The Board reported that the increased gas charges would amount to about 2d. per week for domestic supplies.

Coke Sales Circle Summer Meeting

Members of the London and Counties Coke Sales Circle spent an enjoyable day at Swindon on July 21 as the guests of the South Western Gas Board. In the morning, they visited the South Western Gas Board's Works at Swindon, where the party were received on behalf of the Board by Mr. W. L. Wright (Area Coke Manager) and Mr. F. J. Mills (Station Engineer). The party were divided into small groups, each of which was shown over the works, particular attention being devoted to the processes entailed in the production of coke, both from vertical and horizontal retorts, its grading and loading into road and rail vehicles. The Circle members were afterwards entertained to luncheon at the Oxford Hotel. Mr. W. L. Wright welcomed the party on behalf of the South Western Gas Board, and Mr. W. J. Candlin, Chairman of the Coke Sales Circle, acknowledged the hospitality with which the Circle had been received.

After luncheon, through the courtesy of British Railways, the party were taken on an extensive tour of the locomotive works, where in the limited time available they were able to see something of the manifold activities involved in the repair and construction of locomotives. The visit concluded with tea.

New Pipeline Contract

Having just completed the 348 mile 16 in. natural gas line from Sui to Karachi in 5½ months, Pakistan Constructors, the joint venture of D. & C. and William Press, Ltd., and Morrison Knudsen Company of Pakistan, have been awarded the contract for an additional 188 miles of the same size pipeline running from the Sui gas fields to Multan, later to be extended to Lahore with branch lines to Kot Addu, Montgomery, Jhang and Maghiana.

Work on this line, which is identical with the Sui-Karachi line, will start in the middle of 1956, completion being expected within six to seven months and is estimated to cost $13,791,540.

The country in which the contractors will work is arid and particularly difficult, there being no rail or road communications. One major crossing of the Indus estimated at five miles is involved.

Women Prefer to Cook by Gas

The Women's Gas Federation, as an affiliated organization of the National Council of Women, was among the organizations asked to contribute views on the ideal house which the National Council of Women plans to build to commemorate its Diamond Jubilee this year, as a residence for successive women who have given outstanding service to the country, on their retirement from public life. The views of many thousands of women are being translated into plans by Mr. Howard Lobb, C.B.E., F.R.I.B.A., for the building of the house at Oxshott, Surrey.

The Women's Gas Federation recommended the use of gas and solid smokeless fuel for all purposes, and to prove that 12,500 women cannot be wrong these two fuels received the greatest support; gas for cooking, and solid smokeless fuel to provide central heating. It was notable that the open grate was not the most favoured form of heating. No doubt labour-saving was the first motive but housewives are also becoming clean-air conscious.

The Electrical Section of the British Industries Fair is to be transferred from Birmingham to London, where it will be held in the Grand Hall, Olympia, from April 23 to May 4, 1956. There will be 100,000 sq. ft. of exhibition space available for the display of a wide range of electrical products, from power station and industrial plant equipment to lighting and domestic appliances.

Twenty-one Employees of the Lanarkshire Division of the Scottish Gas Board have been presented with safe-driving diplomas. Chief Constable Thomas Renfrew, C.B.E., who presented the awards, complimented the men on driving for a whole year without having any accidents. He hoped that the day was not far off when Lanarkshire would be accident-free. Mr. James Dow, Divisional Controller of the County Division thanked the Chief Constable for honouring the gathering.

Metolite
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DOMESTIC COOKERS
GAS REFRIGERATORS, FIRES, ETC

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FOR CYLINDERS AND TANKS

The combining of two fittings, i.e. the "Essex" flange and the standard union connection, provides the Fitter with the ideal connection between service pipe and cylinder or tank when installing H.W. Circulators.

It is no longer necessary to purchase two separate fittings. The "Essex" flange is now obtainable combined with the pipe union as one complete connection.

Two in One **Packed in carton Complete and Ready to use.**

The NEW ESSEX COMBINATION FLANGE means
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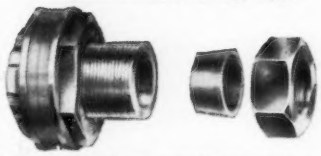
Illustration shows—Flange complete with cone and hex. nut for L.G. copper pipe



Also obtainable with bent or straight tails for lead pipe.

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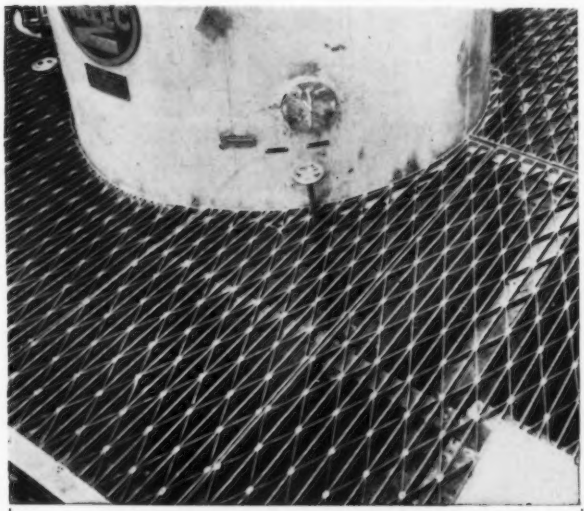

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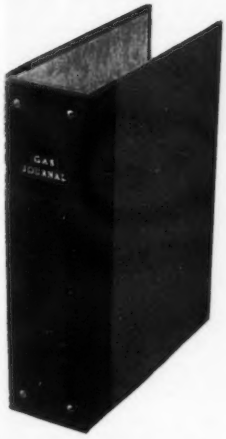

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The " Gas Journal " is published every Wednesday, price 1/3d.; by post 1/5d.

Subscription Rates: Home and Empire:—52/- per annum; Foreign:—60/- per annum. (Both payable in advance.) A copy of the " Gas Journal " Calendar & Directory is presented each year to continuous subscribers.

Classified Advertisements: All small classified advertisements are charged at 2/- per line (approx. 7 words)—minimum charge 10/-. A Box Number address occupies 2 lines, and a further 6d. is charged towards cost of postage on replies. Copy must be received by first post on Monday to ensure insertion in that week's Journal.

Displayed Advertisements: Rates obtainable on application to the Business Manager. Change of copy for displayed spaces must be received 14 days prior to publication if proofs are required. Type area of inside pages 10 in. deep × 7 in. wide; block screen 120.

BUSINESS MANAGER: S. T. CULLEN

MIDLANDS MANAGER: G. B. Torrance, 42, Wychall Lane, King's Norton, Birmingham, 30. *Telephone:* Kings Norton 3868

NORTHERN MANAGER: Philip W. B. King, Flat 1, 7 Langcliffe Avenue, Harrogate. *Telephone:* Harrogate 67625.

SOUTHERN REPRESENTATIVE: A. Engelhardt, 11, Bolt Court, Fleet Street, E.C.4. *Telephone:* Central 2236-7

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APPOINTMENTS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive or a woman aged 18-59 inclusive unless he or she, or the employment, is excepted from the provisions of the Notification of Vacancies Order, 1952.

SOUTHERN GAS BOARD

CENTRAL DIVISION
READING AND DISTRICT GAS UNDERTAKING
TECHNICAL ASSISTANT

APPLICATIONS are invited for the post of TECHNICAL ASSISTANT at the Reading Works at a salary within Grade 6 (Provincial A) of the National Salary Scales, £565-£645 per annum.

Candidates should have had experience of gas production on a medium or large works and preference will be given to those possessing a technical qualification.

The post is pensionable and the successful applicant will be required to pass a medical examination.

Applications, stating age and experience and giving details of training and the names of two referees, should reach the undersigned not later than August 20, 1955.

ATHOL W. BROWN,
Group Manager.

P.O. Box No. 34,
King's Road,
Reading, Berks.
July 26, 1955.

SOUTH EASTERN GAS BOARD

HOME SERVICE ADVISER
EAST SURREY DIVISION

SUCCESSFUL applicant will be required to conduct demonstrations, give lectures and advise consumers in their own homes in the use and care of gas equipment.

Preference will be given to applications from persons who:—

(a) have had not less than three years' experience in demonstrating in Gas Industry; and
(b) have undergone training for two years at a recognised training college of Domestic Arts; and
(c) hold a diploma in cookery, housewifery and laundry work.

Salary within Grade 6 (Met. Area) £483-£547 p.a.

Applications will be considered from persons who have not the experience indicated in (a) above, but in such circumstances the commencing salary will be within a lower grade than 6.

Applications in writing quoting reference V10/568 and giving full details should reach the undersigned not later than ten days after the publication of this notice.

R. J. MCCRAE,
Personnel Manager.

Katharine Street,
Croydon.

NORTH WESTERN GAS BOARD

APPLICATIONS are invited for the following pensionable appointments:—

CENTRAL LANCASHIRE GROUP
STATION ENGINEER
CLOUGHFOLD WORKS, ROSSENDALE

(Commencing Salary £1,000 per annum)

The successful applicant will be responsible to the Group Production Engineer for the operation and maintenance of the Station. Candidates should be Corporate Members of the Institution of Gas Engineers and have had experience in the operation of horizontal retorts.

DISTRICT ENGINEER—(DISTRIBUTION)
BURY-ROSSENDALE DISTRICT

(Salary within Grade A.P.T.11—£785-£910 per annum)

The successful applicant will be responsible for distribution engineering work in the district whether by direct labour or contract and for the preparation of new schemes. Experience of high pressure gas distribution will be an advantage.

Detailed applications giving the names of two referees should reach the General Manager, N.W.G.B. (Central Lancashire Group), Gas Offices, Dane Street, Rochdale, within 14 days.

PRESTON GROUP
DISTRICT SERVICE MANAGER
PRESTON DISTRICT
(Commencing Salary £1,200 per annum)

The person appointed will be responsible for all aspects of consumer service within the area of the Preston Undertaking, including the organisation of appliance installation and servicing staffs. He will also be responsible for the control of showrooms and all sales personnel and the Group appliance and meter repair workshops.

Detailed applications, giving the names of two referees, should reach the General Manager, N.W.G.B. (Preston Group), 108, Fishergate, Preston, within 14 days.

YOUNG man required by Trade Association of firms in a basic heavy industry, for work of statistical and economic character. The post will enable the man appointed to familiarise himself with the economics of the industry and may lead to an appointment dealing with the commercial work of the Association. No special qualifications are laid down, but adaptability and keenness are essential, and interest in and knowledge of the fuel and other heavy industries would be useful. Salary according to age and qualifications. Apply in writing, with the names of referees, not later than August 20, 1955, to No. 251, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

NORTHERN GAS BOARD

SUNDERLAND DIVISION
UNIT MANAGER—STANLEY/ANNFIELD PLAIN UNIT.

APPLICATIONS are invited from suitably qualified persons for the position of Unit Manager at the Stanley/Annfield Plain Unit, at a commencing salary within A.P.T. Grade 8/9 (£660/£800).

Candidates should have sound knowledge of Distribution practice and general administration of an undertaking of 8,800 consumers.

The post is pensionable and the successful candidate will be required to undergo a medical examination.

Application stating age, qualifications and details of experience together with the names of two referees, should be addressed to the undersigned not later than August 8, 1955.

W. O. KIRKWOOD,
Divisional General Manager.

P.O. Box No. 39,
Fawcett Street,
Sunderland.

SCOTTISH GAS BOARD

KILMARNOCK GROUP
KILMARNOCK DISTRICT
TECHNICAL ASSISTANT—DISTRIBUTION

APPLICATIONS are invited from suitable persons for the post of TECHNICAL ASSISTANT in the Distribution Department of the Kilmarnock District Undertaking.

Applicants should have some experience of the work involved in the administration of a Distribution Department, with particular reference to the keeping of mains and service records and the preparation of drawings.

The grading applicable to the post is A.P.T. 4, Provincial 'A,' which at present is £365/£555 and the placing on the scale will depend on experience and qualifications.

Applications, endorsed—"Technical Assistant—Distribution"—giving age, qualifications, experience, and the names of two referees, should be addressed to the undersigned, to reach him within two weeks from the appearance of this advertisement.

ROBT. FIFE,
Group Manager.

Riverbank Gas Works,
Kilmarnock.

WALES GAS BOARD

GENERAL MANAGER
NEWPORT UNDERTAKING

APPLICATIONS are invited for the position of GENERAL MANAGER of the Newport Undertaking.

Candidates for the appointment, which will carry a salary of £2,075 per annum, must have had wide administrative experience and possess appropriate qualifications.

Applications stating age, qualifications and experience, together with details of present and previous appointments and names of two referees, should be received by the undersigned not later than September 1, 1955.

C. B. MAWER,
Secretary to the Board.

2, Windsor Place,
Cardiff.

WALES GAS BOARD

DOMESTIC SALES AND SERVICE OFFICER

APPLICATIONS are invited for the post of DOMESTIC SALES AND SERVICE OFFICER for South and Central Wales.

Applicants must have organising and administrative ability. General commercial experience, either in the gas industry or in other large-scale organisations, will be of advantage.

The commencing salary will be £1,500 per annum. The post is pensionable and the successful applicant will be required to undergo a medical examination.

Applications stating age, qualifications and experience, together with the names of two referees, should be received by the undersigned not later than first post on Monday, August 29, 1955.

C. B. MAWER,
Secretary to the Board.

2, Windsor Place,
Cardiff.

SOUTH WESTERN GAS BOARD

CHELTENHAM DIVISION
CHELTENHAM WORKS
APPOINTMENT OF SENIOR WORKS CHEMIST

APPLICATIONS are invited for the position of SENIOR WORKS CHEMIST at the Cheltenham Works. Applicants should be familiar with all Gas Works Chemical Tests and the Chemical Control of Plant. Possession of the Higher National Certificate in Chemistry or equivalent qualification is desirable. Salary will be within Grade APT.8—£660-£740.

Applications should be sent to O. H. W. Boonham, Esq., Production Engineer, Cheltenham Division, Gloucester Road, Cheltenham, by August 20, 1955.

EAST MIDLANDS GAS BOARD

LEICESTER AND NORTHANTS DIVISION
SENIOR TECHNICAL ASSISTANT (DISTRIBUTION)—NORTHAMPTON GROUP

APPLICATIONS are invited for the position of SENIOR TECHNICAL ASSISTANT to the Group Distribution Engineer at Northampton. The commencing salary will be within the range £620/£740 per annum according to age and experience.

Applicants must at least hold the Ordinary Grade Certificate in Gas Engineering (Supply), should have a thorough knowledge of modern methods of distribution, including high and low pressure systems, and be capable of carrying out the detail work in connection with the planning and estimating of new work.

The post is pensionable, and the successful applicant may be required to pass a medical examination.

Applications, stating age and giving details of education, qualifications and experience, together with the names of two referees, should be addressed to Mr. E. B. Craddock, Group Manager, 45, Abington Street, Northampton, not later than August 17, 1955.

H. B. TAYLOR,
Divisional General Manager.

Leicester.
July 22, 1955.

EAST MIDLANDS GAS BOARD

NOTTS AND DERBY DIVISION
SENIOR DISTRICT REPRESENTATIVE
BURTON-UPON-TRENT DISTRICT

APPLICATIONS are invited for the position of SENIOR DISTRICT REPRESENTATIVE in the Burton-upon-Trent District.

The successful applicant will be required to co-ordinate the work of the District Representatives, the District Gas Fitting Foremen and the District Clerks in order to promote the maximum sales of gas coke and suitable appliances and to maintain a high standard of service to the consumer.

The commencing salary will be within the range of A.P.T.6 (£565/£645) according to qualifications and experience.

The position is pensionable and the successful applicant will be required to pass a medical examination.

Applications stating age, experience, qualifications and training, together with the names of two referees, should be submitted to the undersigned not later than Saturday, August 13, 1955.

K. L. PEARCE,
Divisional General Manager.

East Midlands Gas Board,
Notts and Derby Division,
P.O. Box No. 62,
Friar Gate,
DERBY.

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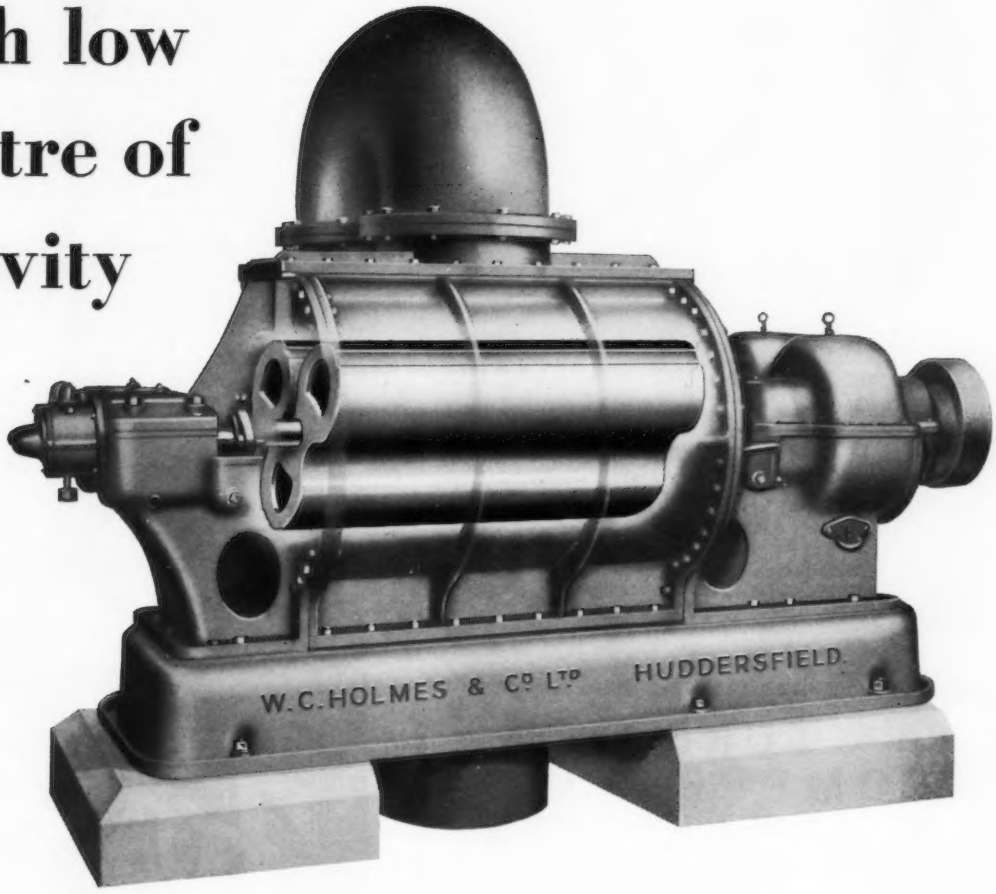
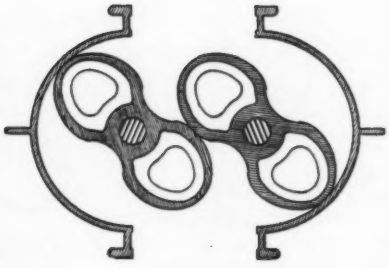


maximum stability



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The "Tornado" method of man-cooling definitely encourages production all the time. Man-cooling fans deliver, for as long as is necessary, a brisk, cooling air current which relieves excessive body heat and improves breathing conditions. Designed particularly for use in the "heavy" trades they combine an easy portability with robust construction — two essential characteristics.

If your concern is for workers in iron and steel works, foundries, boiler houses, gas retort houses, glass works or "lighter" industries where efficiency is bound up with the maintenance of comfortable working conditions then you should see Publication No. 9/7.

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MH3

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these Tower Purifiers for the National Coal Board at Avenue, near Chesterfield, when completed will have a capacity of 26,000,000 cubic feet of gas per day.

Photograph by courtesy of National Coal Board, East Midlands Division

by

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